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ABSTRACT

Intended for use by vocational teacher educators, state administrators seeking to expand teacher education opportunities, and local school administrators who wish to employ women teachers in a broader range of programs, the model presented here is designed to facilitate the retraining of women teachers and skilled women to teach in nontraditional secondary vocational education programs. Focus is on the feasibility of retraining programs, identification of alternative approaches to meeting teacher qualifications, and constraints teacher educators and school administrators are likely to encounter. Section 1 presents rationale including discussion of the oversupply of teachers, demand for vocational teachers, underrepresentation of women in male-intensive skilled occupations, and elimination of sex stereotyping and sex bias. The model itself is presented in section 2 under headings of certification requirements, characteristics of the women, and time required to attain skills levels and operate the retraining model. Program design is outlined for five types of programs: trade and industrial education, technical education, agriculture, cooperative education, and industrial arts. Section 3, a handbook with guidelines for implementation, it covers issues in planning (e.g., needs assessment, funding sources, and evaluation plan) as well as techniques and programs responding to special needs (e.g., selection of applicants for pilot program, counseling and support program, training seminars for project team, and placement system). (JT)

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FINAL REPORT

Contract No. 300-76-364

A Model to Retrain
Women Teachers and Skilled Women
as Teachers in
Non-traditional Vocational Programs

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FOREWORD

This project originated from the deep concern of the Bureau of Occupational and Adult Education about the need to eliminate sex-role stereotyping in vocational education programs. In order to address one aspect of this problem, the Bureau has funded this project for the development of a model to facilitate the retraining of women teachers and skilled women to teach in non-traditional secondary vocational education programs. In their teaching capacity, these women will serve as role models for secondary women students who enroll in vocational education programs which traditionally have had a predominantly male enrollment.

It is hoped that this product will serve many people, such as vocational teacher educators, State administrators seeking to expand teacher education opportunities, and local school administrators who wish to employ women teachers in a broader range of programs. This model attempts to illustrate the feasibility of retraining programs, to identify alternative approaches to meeting teacher qualifications, and to recognize constraints teacher educators and school administrators are likely to encounter. The resources needed to plan realistically for the implementation of such a model are also discussed.

A word of appreciation should go to those who are responsible for the completion of this project. The initial design was conceptualized by Bureau staff but primarily by Dr. Mary Lovell, an education specialist in the Bureau's Planning Unit, who also served as the project's program monitor. Special acknowledgement is given to the responsiveness of the contractor, and the expertise of the research team.

Dr. Charles H. Buzzell
Acting Deputy Commissioner for
Occupational and Adult Education

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I. Rationale for a Retraining Model

The impetus for developing a model to retrain women elementary and secondary school teachers and skilled women to become teachers in traditional male-intensive 1/ secondary vocational education and industrial arts courses 2/ has emerged from a combination of problems and issues. These include:

- the oversupply of teachers of basic subjects at the elementary and secondary level, most of whom are women;
- the increased demand for vocational education teachers;
- the underrepresentation of women in male-intensive occupations in the labor force; and
- the need to eliminate sex stereotyping and sex bias in vocational education.

One of the methods proposed to eliminate sex stereotyping and sex bias in vocational education is to increase the number of women teaching male-intensive vocational education classes, thereby providing young women with appropriate role models and encouragement to enter male-intensive secondary school vocational programs.

The Model described in Chapters II and III is designed as one means of responding to these issues. By outlining a Model to retrain women to become teachers of male-intensive vocational programs at the secondary level, it represents a first step effort in bringing about more women teachers at all levels. In this section, we discuss the major problems that the retraining Model attempts to address. The second section describes the Model in conceptual terms, discussing the various issues that must be considered in the design of such a model. The third section is formulated as a "How To Manual" and details the various components essential to the design and implementation of the Model by universities and State Departments of Vocational Education. The implementation of the Model proposed in this Handbook would represent a major effort by a state to address the problems of women teachers, as well as young women seeking to pursue male-intensive vocational occupations.

A. The Oversupply of Teachers

A recent survey of education graduates indicated that in 1973 about 27,000 or 16% of the graduates who sought employment could not find teaching jobs. 3/ The degree of difficulty in finding employment varied markedly among geographic areas and by subject fields. Those having the greatest difficulty were secondary school teachers in the West, where 24% were unable to find employment. On the other hand, the large school districts, especially urban inner city districts, received fewer applicants and hire more of them than other areas. 4/

1/ Male-intensive programs are defined in this Handbook as those programs in which 0.0 to 25.0% of the students nationally enrolled are women.

2/ According to the Vocational Education Act of 1963 as amended in 1972 and 1976, Industrial Arts programs became reimbursable under the Act. Hereinafter in this Handbook vocational education will also include industrial arts, and is referring to male-intensive vocational education exclusively.

3/ National Education Association. Research on Teacher Supply and Demand in Public Schools, 1973, Washington, D.C.: National Education Association, 1974.

4/ Ibid.

A study of graduates from teaching institutions revealed that even though there was a consistent drop nationally in the number of graduates between 1963 and 1973, 1/ eight states 2/ reported an increase in the number of graduates with degrees in elementary school teaching, and an additional eight states 3/ reported an increase of graduates to teach at the high school level. The remaining states indicated a reduction in the number of graduates prepared to teach elementary and secondary school subjects; however, there were still more elementary and secondary teachers graduating than there were teaching positions becoming available for them. There was little likelihood that there would be opportunities for employment for all of them in their specialties. 4/

The decline in teaching positions has especially negative impact on women since teaching continues to be the primary occupation of women professionals. Fifty three percent of all women in the labor force with a college education are in the teaching profession, while only 19% of men with a college education are so employed. 5/ Over two-thirds of all elementary and secondary school teachers are women.

The number of teaching positions is declining more than has been expected, since fewer teachers are leaving teaching than had been projected. During the past 15 years, new graduates of teacher education programs have filled about 75% of the annual demand for teachers, while the remaining 25% of the teaching positions have been filled by former teachers (most of them women) who are returning to the labor force usually after childbearing and childrearing. 6/ Fewer teachers during the last decade left their jobs for homemaking, and those who did leave returned to the labor force in short order. Under the circumstances, if new and returning teachers are to find employment, they will have to be channeled into different specialties. If they are to obtain employment as teachers, a re-training model will be essential.

B. The Demand for Vocational Education Teachers

Unlike most other areas of teaching, there has been a growing shortage of teachers of vocational education, and the trend is expected to continue into the 1980's. This shortage of teachers is a reflection of the tremendous increase in vocational education enrollment over the last decade.

1/ Association for School, College and University Staffing, "A Current Assessment of Teacher Supply and Demand in the U.S.," October 1976. (Unpublished paper)

2/ Colorado, Florida, Idaho, Maine, Massachusetts, Mississippi, Tennessee, and Texas.

3/ Florida, Kansas, Mississippi, Montana, New Jersey, North Carolina, Tennessee, Texas.

4/ Association for School, College and University Staff, Ibid.

5/ U.S. Department of Commerce, Bureau of the Census, 1970 Census of the Population, Detailed Characteristics, U.S. Summary, Washington, D.C.: U.S. Department of Commerce, 1973.

6/ Padilla, Arthur H. The Market for Teachers in the Nation and the Southern Region, Atlanta, Georgia: Southern Regional Education Board, 1975.

Between 1965 and 1973 vocational enrollments increased 166%, while total school enrollments increased 27%.^{1/} In 1972, vocational education accounted for 42% of all secondary school enrollments. By 1978, according to the U.S. Office of Education, vocational programs will account for more than 60% of secondary school enrollments.^{2/}

A General Accounting Office (GAO) report confirmed this trend, finding that in only three teaching areas was there a strong demand for teachers: special education, industrial arts, and "trade, industrial, vocational and technical" education.^{3/} During the 1972 school year, approximately 3,000 funded vacancies were not filled because of the shortage of qualified applicants in these fields.^{4/} Thirty-seven state education departments responding to the GAO survey indicated the existence of unfilled jobs in trade and industrial education, 29 had unfilled vacancies in industrial arts, and 9 had a shortage of teachers in agriculture (although 23 states indicated a surplus).

In another study, conducted in 1976 by the Association for Schools, Colleges, and University Staffing (ASCUS), that examined 60 large school systems, 37 local education agencies (LEA's) reported a low or extremely low supply of qualified industrial arts applicants, and 36 LEA's reported a similar shortage of applicants for trade and industrial positions.^{5/}

Thus, in the face of the general surplus of elementary and secondary school teachers, shortages of vocational education teachers still exist almost nationwide. Table 1-a (p.A-1) summarizes the results of the study conducted by ASCUS, which shows the states in which there is an undersupply, oversupply, or a balance of teachers in male-intensive vocational education programs in relationship to the demand.^{6/}

The labor market demand in a given field is also crucial to determining the relative demand for specific vocational education programs, and therefore, the relative demand for teachers of those subjects. The fastest-growing labor demand areas reflect a wide variety of occupational areas which will need expanded numbers of teachers during the next few years. Table 1-b (pp. A-2 to 4) details the projected expansion of state services in male-intensive vocational training at the secondary school level. National labor projections for employment in occupations that can be prepared for by trade and industrial

^{1/} Market Data Retrieval, Inc. The Guide to Vocational Education in America: Trends to 1978, 1975.

^{2/} Ibid.

^{3/} U.S. General Accounting Office. Supply and Demand Conditions for Teachers and Implications for Federal Programs, by the Comptroller General of the United States, Washington, D.C.: U.S. General Accounting Office, March 6, 1974.

^{4/} According to the National Education Association, there was also a lack of female-intensive teachers or other personnel--546 librarians, 583 teachers of music, 460 physical and health educators, 22 distributive education teachers. Demand for teachers in business education and home economics was low.

^{5/} Association for School, College, and University Staffing, Ibid.

^{6/} Tables are to be found in the Appendix.

and technical vocational programs are detailed in Tables 1-c and 1-d (pp. A-5 and 6). For example, it can be expected that labor market demand will result in an increase, nationally, in the demand for teachers in the construction trades and in all classes of repair and mechanical trades between now and 1980. 1/

In order to meet the need to provide adequate numbers of teachers in vocational education, Public Law 94-482 stipulates that individuals "presently certified, or had been so certified within the last 10 years, by a State as teachers in elementary and secondary schools, and have past or current skills and experiences in vocational fields" or "employed in industry who have skills and experiences in vocational fields for which there is a need for vocational educators," may be retrained to be vocational teachers. 2/

C. Underrepresentation of Women in Male-Intensive Skilled Occupations in the Labor Force

Evidence of sex discrimination and sex stereotyping 3/ in employment is found by examining the occupations in which men and women work. Twenty-five percent of all employed women work in five occupations--kindergarten and elementary school teachers, typists, waitresses, sales clerks, and secretaries, and over one half of all working women are clustered in 17 occupations 4/ compared to 63 occupations for the same percentage of men.

Although women made up 41% of the labor force in 1976 5/ their occupational opportunities have remained relatively static over the past thirty years. Estimates from the Bureau of Labor Statistics 6/ show 56% of all working women are in clerical or service occupations compared to 15% of all working men. On the other hand, women made up only 4.8% of skilled (craft and kindred) workers in the labor force in 1976. 7/ The sex stereotyping and discriminatory practices that result in pre-selection of school courses on the basis of sex, predetermine the low wages received by women clustered in the clerical and services areas throughout their adult lives. (See Table 1-e on p. A-7.)

1/ U.S. Department of Labor, Tomorrow's Manpower Needs, Volume IV, Revised, Washington, D.C., U.S. Department of Labor, Bureau of Labor Statistics, 1971.

2/ U.S. Congress, Education Amendments of 1976, Public Law 94-482, Title I--Vocational Education, October 12, 1976.

3/ Sex stereotyping refers to cultural biases attributed to one sex held by society in general, such as women should not do "men's" work, and vice versa. Sex discrimination refers to that which is against the law on discriminatory practices based on sex.

4/ Registered nurses, kindergarten and elementary school teachers, teachers' aides, bookkeepers, cashiers, receptionists, secretaries, typists, file clerks, sewers and stitchers, cleaning services, waitresses, health services, private household workers, telephone operators, personal services, and food service workers.

5/ U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, January 1977.

6/ U.S. Department of Labor, Bureau of Labor Statistics, Employment Data for Detailed Occupations 1975, Table A-21, "Employed Persons by Major Occupational Group, Sex, Color," p. 42.

7/ Employment and Earnings, January 1977.

Hedges and Bemis report that an increasing number of women have been entering the crafts each year since 1970. The period from 1900 to 1960 was a static period for women entering the crafts. The participation of women during that period fluctuated from 2 to 3 percent, except for the 1940's during World War II, when participation rates reached 5 percent; a figure well below the public image of the prevalence of "Rosie the Riveter." 1/ In 1974, women's participation in skilled occupations was finally again up to 5 percent, 2/ albeit still a small number.

For women with a high school diploma and some training, the skilled trades offer real job opportunities, since there is an expected yearly expansion of 400,000 through 1985 in skilled jobs that can be trained for through trade and industrial non-traditionally vocational training. 3/ Data from the Current Population Survey in 1973 and 1976 indicate that between 1970 and 1976 the number of women in skilled occupations did, in fact, expand, and the Bureau of Labor Statistics (BLS) predicts a continuing growth. 4/

Research 5/ has indicated that women students need role models of the same sex to help them adjust successfully to non-traditional education. Thus, if the goal of reducing sex stereotyping and increasing the number of women secondary school students who enter and remain in non-traditional vocational training is to be achieved, increasing the number of women teachers in male-intensive vocational subjects is an important objective. The retraining model here proposed can be an important first step toward that objective.

D. Eliminating Sex Stereotyping and Sex Bias

Although only 7.5% of the women secondary school students in 1975 6/ were enrolled in male-intensive occupations, the percentage of women teachers of these male-intensive courses was even more limited. Very few states have kept data on vocational education teachers, but a survey of the states that accumulated data on vocational education teachers by sex in 1976 indicates that the seriousness of the problem of the absence of women

1/ Hedges, J.N. and S.E. Bemis. "Sex Stereotyping: Its Decline in Skilled Trades," Monthly Labor Review, May 1974.

2/ Employment and Earnings, January 1977.

3/ U.S. Department of Labor, Bureau of Labor Statistics. Tomorrow's Manpower Needs, Volume IV, Revised, Washington, D.C.: Bureau of Labor Statistics, 1971.

4/ The increase may seem more dramatic perhaps, because the numbers of women in skilled trades are so low that any increase is significant.

5/ See, for example, DiSabatino, Marie. "Psychological Factors Inhibiting Women's Occupational Aspirations and Vocational Choices: Implications for Counseling" in The Vocational Guidance Quarterly, September 1976; Bandura, A. Principles of Behavior Modification, New York: Holt, Rinehart and Winton, 1969; Vincenti, Harry. "Minimizing Occupational Stereotypes" in The Vocational Guidance Quarterly, March 1977; and Baruch, R. "The Achievement Motive in Women: Implications for Career Development," Journal of Personality and Social Psychology, Volume 5, 1967.

6/ Based on Rj Associates' Survey of State Departments of Vocational Education collected in connection with this study.

teachers in male-intensive occupations is far greater than the underparticipation of women students. In the five states reporting vocational education teachers by sex, (Table A-1, below), women represent an average of 0.9% of the male-intensive trade and industrial teachers, 0.8% of the agriculture teachers, and 2.5% of the industrial arts teachers. ^{1/}

Table A-1. -- Women Teachers Employed in Secondary Male-Intensive Vocational Education Programs in Five States -- 1976

States	Male-Intensive Programs								
	Trade and Industrial			Agricultural			Industrial Arts		
	Male	Female	Percent Female	Male	Female	Percent Female	Male	Female	Percent Female
MD	392	14	3.5	49	3	5.8	491	81	14.2
NY	2353	28	1.2	325	8	8.4	9713	87	0.9
ND	75	0	0.0	88	0	0.0	N/A	N/A	N/A
SC	1059	3	0.3	450	2	0.4	154	0	0.0
TX	1623	7	0.4	823	1	0.1	1767	147	7.7
Total of 5 States	5502	52	0.9	1735	14	0.8	12,125	315	2.5

SOURCE: Survey of State Departments of Vocational Education collected in connection with this study.

The Office of Education projects an increase in the number of women expected to enroll in agriculture, technical, and trade and industrial education at the secondary school level. In 1972, women accounted for 5% of agricultural education enrollment; by 1978, women are predicted to be 10% of enrollment. In 1972, 10% of the technical education enrollments were women; by 1978, 17% are expected to be women. In 1972, 12% of trade and industrial enrollments were women; the proportion is expected to rise to about 19% by 1978. ^{2/}

The number of women preparing to teach these male-intensive programs is by no means encouraging. Of women education students less than 1% are completing their B.A.'s in male-intensive vocational subjects. ^{3/} Thus, little change can be expected among the male-intensive vocational teachers unless major efforts are made to change the male domination of the teaching of these vocational education courses.

^{1/} Data by sex, by detailed program classifications are not currently required of states by U.S. Office of Education.

^{2/} U.S. Department of Health, Education, and Welfare, Office of Education. A Look at Women in Education: Issues and Answers for HEW, Washington, D.C., 1972; and U.S. Department of Health, Education, and Welfare, Office of Education, Summary Data Vocational Education, Fiscal Year 1972.

^{3/} National Center for Education Statistics. Students Enrolled for Advanced Degrees, Fall 1972, Washington, D.C., U.S. Department of Health, Education, and Welfare, NCES, 1975.

E. Summary

This introduction has described the rationale for developing a retraining model that will respond to identified needs:

- The oversupply of elementary and secondary school teachers, most of whom are women.
- The demand for teachers in male-intensive vocational education programs.
- The underrepresentation of women in male-intensive skilled occupations in the labor force.
- The insignificant number of women teaching male-intensive vocational subjects who can serve as positive role models for secondary school young women.

The development of projects designed to address these conditions is included in the national objectives for vocational education as stated in the Vocational Education Act of 1976. ^{1/} The retraining model described is designed to facilitate the efforts of educators to respond to these issues.

^{1/} Vocational Education Amendments of 1976, Public Law 94-482, October 12, 1976.

II. Retraining Model

A. General Retraining Model

The retraining model being proposed is unique in that it defines the first program designed specifically to prepare women to become teachers of male-intensive secondary vocational programs. The objective of the model is to train several categories of women represented on the vertical axis in Figure B-1 to teach in the male-intensive vocational programs which are represented on the horizontal axis.

Figure B-1
General Retraining Model

	Trade and Industrial Education	Agricultural Education	Technical Education	Cooperative Education	Industrial Arts Education
Elementary School Teachers	2/	2/	2/	1/	2/
Secondary School Teachers					
Women with A.A. degree from post-secondary male-intensive vocational programs					
Skilled women with work experience					

In order for the model to be useful and responsive to the realities that will be faced in its initiation (or initiating components of it), there are several conceptual issues which must be addressed. The conceptual issues provide the framework within which the model can be utilized on a practical level. They include:

- The certification requirements for each male-intensive vocational program area; 3/
- The characteristics of each category of women and the skills and background they are likely to possess when they enter the program;
- The time required to attain competency as it relates to certification requirements; the length of time funds to pay stipends will be available.

1/ For types of Cooperative Education included in this Handbook, see Section d. on p. 11.

2/ Based on U.S. Office of Education's Standard Terminology for Curriculum and Instructions in Local and State School Systems.

3/ In all cases, vocational education, trade and industrial, etc., is referring only to male-intensive programs.

This chapter will discuss each of the conceptual issues as they impact the retraining model. The chapter concludes with a summary of the model which shows the feasibility of each cell for implementation given the conceptual parameters and provides alternatives for model program designs.

1. Certification Requirements

The certification of teachers is a prerogative of each individual state and as a result there is considerable divergence among the states. The authority to certify or to recommend certification of vocational teachers has in many states been transferred to the State Departments of Vocational Education from the certification offices within the State Departments of Education. The requirements for vocational certification are quite different from the certification requirements of general education teachers and respond to the different skills and competencies needed to successfully teach in a vocational program. With the tremendous expansion of vocational education which has resulted in the great demand for qualified teachers, vocational education has become more flexible in recognizing both an educational background, as well as occupational experience for certification purposes.

Another approach to vocational education certification is that of the "approved program" whereby universities within a state work closely with the State Department of Vocational Education and certification and curriculum specialists, to design a pilot or exemplary program that provides candidates with the educational background and occupational experiences necessary to meet the competencies required for certification, by the criteria of the university and with the concurrence of the State Department of Vocational Education. A candidate who successfully completes a program that has been approved is recognized as having met the requirements for certification.

Among vocational education administrators and university faculty, there are diverse opinions and ideas concerning what occupational experiences and educational backgrounds are necessary to teach vocational education. This is reflected in the diverse certification requirements among the states--some states requiring many years of work experience, others requiring fewer years and/or recognizing educational attainment in lieu of some years of work experience.

Within the State Department of Vocational Education there can be different approaches to certification by vocational program area. Among the various vocational program areas, states often have more than one approach or method to meeting minimum certification requirements. For example, a state may require a bachelor's degree and one year work experience to teach agricultural education, but require only a high school diploma and several years work experience to teach in a trade and industrial education program. Additionally, in a single state, within trade and industrial education, requirements may vary.

For example, in Iowa a candidate for trade and industrial education can be certified upon:

- completion of an approved baccalaureate degree program at a recognized institution approved for the preparation of career

education teachers. The approved program must provide for an option of demonstration of occupational competence by performance and written examination and/or a supervised internship to gain practical occupational experience in the specialty area of approval.

OR

- A minimum of 6,000 hours or three years of recent, practical trade experience above the formal learning level in the subject to be taught and career teacher education courses outlined under professional education. In assessing the occupational experience, consideration should be given to the quality, relevancy, and diversity of such experience.

Another example is Michigan, where an applicant for a Vocational Certificate in trade and industrial education must have:

- Completed an approved teacher education program, with a major or minor in an occupational area, and two years of recent and relevant experience in the occupational area or completion of a planned equivalent program.

OR

- Possessed the equivalent of two years appropriate occupational experience, with the candidate's competency determined by the local school district and the Michigan Department of Education in terms of combined educational, occupational, and teaching experience. The candidate must have work experience at the journeyman level in apprenticeable trades.

Candidates are required to document their work experience by submitting evidence of their employment history, skills, employers, etc., for evaluation. A certification officer interprets and evaluates that experience to determine if the candidate has the occupational skills. In recent years, there has been a trend toward utilizing occupational competency examinations to determine if a candidate is competent to teach. Some states have moved more quickly to utilizing the examinations than others and the examinations are used in different ways in different states. For example, a few states now require successful performance of the examination for certification (Pennsylvania and South Carolina, for example); other states will give credit toward required years of work experience for the examination (which is not mandatory), but require a certain number of years of work experience in addition to the examination (Florida and Utah, for example).

Among the five male-intensive secondary school vocational programs (trade and industrial education, agriculture, technical, cooperative and industrial arts), trade and industrial education is the only area where examinations are widely used to determine occupational competency, or as a substitute for part of the required work experience.

Occupational competency tests are usually administered by teacher training institutions. Some utilize tests which have been developed by their own institutions, others make use of those developed by the National Occupational

Competency Testing Institute (NOCTI), which are the most widely given standard tests in this area. Currently, there are 44 states participating in the program as a consortium of states, and 36 area test centers have been established throughout the United States.

The content of NOCTI tests (as well as some others) consists of two sections, a written section and a performance section. The written test covers factual knowledge, technical information, understanding of principles and problem-solving abilities related to the occupation. The performance test is designed to sample the manipulative skills specifically required by that occupation.

The development of a model to train elementary and secondary teachers and skilled women to teach in secondary vocational programs must utilize certification requirements as a framework around which programs are to be designed. The Model first defines the skills and competencies required to meet certification requirements. Then the Model development recognizes the skills and competencies which each of the target populations brings to the program. The Model considers the educational and occupational experiences required to move candidates to qualify for vocational certification, building on the skills they already have to achieve the competencies they will need to teach in a specific area. The Model is also placed within a time frame sufficient to gain the skills, but also within the time limit that stipends will be available (two years). This section describes the certification requirements in the vocational program areas of trade and industrial, technical, agricultural, cooperative, and industrial arts education:

a. Trade and Industrial Education

In 1969, Wayne S. Ramp, Professor of Occupational Education at Southern Illinois University, undertook a study of trade and industrial certification requirements, acquiring information from 50 states over a three year period. In an attempt to find some commonalities in the certification requirements that would provide information useful to teachers who move across statelines, Ramp concluded:

There seems to be no single aspect that is constant across all states; and while there are commonalities and similarities among the states, it is impossible to generalize a single requirement across all states. About all that can be assumed with any degree of certainty is that vocational teachers in reimbursed programs in all states must possess some amount of work experience and are supposed to have been exposed to some teacher education experiences. 1/

Historically, trade and industrial education teachers have been recruited from the occupation, given temporary or provisional certification and then required to complete teacher training programs of varying kinds. As vocational education has broadened its scope, and new occupations requiring training continually emerge in the labor force, the system for certifying trade and industrial teachers has been changing.

1/ Ramp, Wayne S., "Vocational Certification: A National Overview," in Seymour T. Brantner's (ed.) Certification of Vocational-Technical Educators, University Park, PA: Pennsylvania State University, 1974.

In addition to a less commonly used approach--that of degree programs wherein students are also required to obtain appropriate work experience--what has emerged is a dual system for certification existing within a state.

The first system of trade and industrial certification which is still the predominant method, relies primarily on years of work experience (in almost all cases, candidates have to have a high school diploma or equivalent). The years of work experience beyond the learner's level required for certification for candidates without a bachelor's degree range from two to eight years.

States often give credit toward work experience requirements for a variety of experiences including completion of training in a vocational or technical institute, training or experience obtained through the military, or credit earned by successfully completing occupational competency tests.

Some states require that a candidate complete some coursework or pre-service training before beginning to teach, but in the majority of states these courses can be completed after the candidate has begun to teach. Whether pre-service or in-service, the courses are primarily designed to provide candidates with essential teaching skills.

The second system is based on the completion of an approved bachelor's degree program in trade and industrial education (e.g. Virginia, North Carolina). A candidate who pursues this approach generally has had a strong vocational background acquired in either high school or postsecondary school, fulfills the required work experience while acquiring the B.A. Approved programs usually offer supervised work experience or an internship component, a situation which generally permits a candidate who lacks sufficient work experience to receive credit for two years work experience for every one year of supervised work. Upon completion of the approved program (including the required years of work experience), a candidate will qualify for certification.

b. Technical Education

Certification to teach technical education is similar to that of trade and industrial education in that the certification requirements in all states require work experience. ^{1/} The number of years of work experience varies from two to five years among the states. The required number of years decreases when a candidate has had specialized academic training. Several states provide a baccalaureate degree approach to certification, but also require an additional one to three years work experience.

c. Agriculture

An examination of the certification requirements in a sample of states throughout the country ^{2/} reveals that most states have two approaches to

^{1/} Sample was based on states with a high secondary technical enrollment and includes Texas, Colorado, New Jersey, New York, and Pennsylvania.

^{2/} Sample states were selected based on forecasts for expanding labor demand in agriculture and include Texas, Ohio, California, Wisconsin, Idaho, Iowa, New Jersey, Illinois, as well as Georgia and Washington, which were selected because of large vocational agriculture enrollments.

certifying secondary school teachers in vocational agriculture; 1/ one approach requires that the candidate have a bachelor's degree; the other approach certifies candidates with less than a bachelor's degree or a degree in a field other than agriculture.

The first approach requires that a candidate have a bachelor of science degree in agriculture or agriculture education; and one or two years of occupational experience. A major in this field includes from 40 to 54 semester hours of technical agricultural coursework depending on the educational institution. Many institutions give course credit for past experience, as well as on-campus work experience with agricultural industries; credit is also given for intern programs of supervised work experience in either an agricultural agency of the government or agri-business. 2/ A candidate who attains certification by this approach would qualify to teach any of the agricultural courses at the secondary school level.

Candidates who do not have a degree--or have a bachelor's degree in a field other than agriculture--need anywhere from one to seven years occupational experience, depending on the state, to qualify for certification. Some states require, in addition, as much as 60 semester hours of pre-service coursework. Candidates certified by this approach are qualified to teach only that specialized agricultural area in which they have had occupational experience.

d. Cooperative Education

Within a state, there may be two types of cooperative teachers (sometimes called coordinators): diversified and/or industrial cooperative teachers. Both are responsible for providing opportunities for students to gain training experience on real jobs under actual working conditions. The difference in the two types of teachers lies in the vocational program areas for which they are responsible--and thus, there are different occupational requirements for certification.

The diversified cooperative teachers are responsible for all vocational programs. A survey of certification requirements for this type of cooperative education teacher indicates that in all cases a bachelor's degree is required. 3/ In addition, most states require one to two years of occupational experience. For a diversified cooperative teacher this experience is broadly defined in most cases as any non-teaching experience in business and industry or a combination of experiences in different fields. In some cases, applicants are required to have had teaching experience.

On the other hand, there are some states that have industrial cooperative teachers within a specific vocational program area. For example, in trade and industrial education, a teacher is only responsible for the cooperative education program for trade and industrial education students. The certification requirements in this case define the occupational experience narrowly, accepting only work experience in occupations directly related to trade and industrial education.

1/ In all cases, certification refers to vocational reimbursable programs.

2/ See undergraduate catalogues for Southern Illinois University and Ohio State University Bulletin.

3/ The states examined included Texas, Virginia, Idaho, Colorado, Maryland, and Georgia.

e. Industrial Arts

The certification of industrial arts teachers is a straightforward process that is administered by state certification offices in much the same way as the certification of general education teachers. Every state requires a bachelor's degree. Very few states require any work experience, and those that require work experience do not require more than one year (e.g., California). Variations exist among the states in the number of industrial arts courses required; most states require candidates to have from 30 to 40 semester hours of coursework in industrial arts.

The specific course requirements vary depending on the state and/or the educational institution, but include courses in industrial arts laboratory curricula, planning and teaching, and a variety of specific skills including metallurgy, manufacturing, graphics, construction, mechanics, and electronics. In many cases, educational institutions will grant course credit for successful performance on proficiency examinations and/or for relevant work experience. In other states, however, to qualify to teach industrial arts at the secondary level requires that teachers meet the certification requirements for a secondary certificate, which vary from 9 to 12 semester credits depending on the state and the educational institution.

2. Characteristics of the Women

The women for whom the program is being designed include:

- New teachers who are trained to teach traditional subjects who have already qualified for elementary or secondary teaching certificates and women with previous teaching experience in traditional subjects who are re-entering the labor force who hold elementary or secondary teaching certificates. These teachers will possess a bachelor's or master's degree.
- Skilled women employed in male-intensive occupations with years of work experience in a specific occupation;
- Women graduates of male-intensive postsecondary vocational programs with or without work experience. They will possess an Associate of Arts degree.

Each of these different groups of women could be profitably retrained--so long as the training programs are designed to give sufficient recognition to their different backgrounds and skills. A critical task will be to determine the skills of a woman at the time that she enters the program and on that basis to identify her best point of entry into the system, in order to make her productive as rapidly as possible. Success will also depend in large measure on the realism with which the sponsor addresses the differing problems of the women who undertake the program. Thus, if the expected work experience required for, say, trade and industrial education in a particular state, cannot realistically be obtained within two years that stipends are likely to be available, women teachers should not be urged to undertake the program, unless the time/money is of no concern to her.

Each of these groups of women differ in their motivation to enter male-intensive vocational education teaching. The availability of jobs as teachers are likely to attract unemployed teachers. Women working in male-intensive occupations who have homemaking and childrearing responsibilities are likely to be attracted by the convenient hours, the longer vacation period, and the opportunity to enter a professional occupation. Women graduates of male-intensive postsecondary programs can probably prepare themselves for a rewarding career most readily through such a program.

In designing a program for women teachers, the following issues should be considered: while women do not lack the capacity to perform manipulative skills relating to an occupation, such skills are learned through repetitive performance. It would take time for women who have not previously acquired these skills to learn to do them well enough to demonstrate them in a teaching situation.

There is nothing in the life pattern of women elementary and secondary school teachers to suggest that this group of women would have acquired the skills, or the occupational training, much less the work experience to qualify them for a trade and industrial education program. What they lack are the essential skills which in some cases may require years to master to achieve a competency level appropriate for teaching trade and industrial courses. Short term work experience is not likely to provide women with skills adequate to teach. Women teachers also lack courses in teaching vocational education, such as methods in vocational education, vocational curriculum development, etc., required for those obtaining a degree in trade and industrial education.

Women teachers would be particularly well prepared to train as industrial arts or as cooperative education teachers in male-intensive areas. Industrial arts generally requires no occupational experience; cooperative education usually requires only one year of occupational experience and in a diversified program this experience can be in any of the occupational areas, or in a combination of areas.

The level of manipulative skills required to meet performance criteria in industrial arts is less than in most other male-intensive vocational areas, and no manipulative skills would be required to carry out the responsibilities of a cooperative teacher. Therefore, the skills required for both would be more readily learned, and the teaching certification more rapidly obtained by teachers already certified in other areas.

Women who have been employed in male-intensive occupations could provide an important source of teachers of male-intensive occupations because those with work experience can readily meet the certification requirements in most states for trade and industrial occupations. On the other hand, they will need either courses in teaching skills, or the academic courses necessary to obtain a degree depending on the vocational area they intend to enter.

Women who have completed an associate degree program in a male-intensive occupation, might be able to go either way--complete their B.A. in the time allocated, or obtain the necessary industrial work experience.

The emphasis in program design should be on both pre-service and in-service training suitable for each type of women, based on the requirements of certification and the training that will permit them to acquire the skills to do their jobs well. Essential to the success of the project are the supportive services that they will need (detailed in Section III).

3. Time Required to Attain Skill Levels and Operate the Retraining Model

In order to place the components of the Retraining Model into a realistic framework, we have considered the issue of time both as it affects the attainment of skill levels, and as it creates other constraints affecting the program.

Funds are available to provide stipends to women participants for a period of two years. (See Section III-A-3.) Since it is unlikely that women will be willing to participate unless they can receive some payment during the training period, it would be unrealistic to propose a program that would take longer than two years. Additionally, two years is probably as long as most women would be willing to invest in preparing to enter a new career area. For these reasons, the Model has been conceptualized within the constraint of a two-year time period. Although this tends to put an artificial time limit on the program, it is realistic if women can obtain the necessary skills within that time frame. Therefore, this section examines the question of whether the years of experience required for certification by the states, particularly in trade and industrial education, are reasonable and reflect good training practices, and to determine whether the number of years required is relevant to the actual acquisition of skills.

There is already much disagreement among states and among vocational experts as to the relative weight to be given to work experience versus skills obtained in a classroom, and the number of years of work experience required prior to teaching. Our objective is to explore these relevant issues and their implications for the retraining model.

It is also important to consider the issue of whether women will require a longer training period to prepare for teaching than it will take to prepare a man. Most men entering the teaching of trade and industrial subjects will have been acquiring mechanical skills and know-how since adolescence. In all cases, the men teachers are likely to have been utilizing relevant manual skills for many years, regardless of employment or training, while women teachers will be expected to acquire these new skills rapidly, with less background and less opportunity to obtain dexterity and facility in performing the entry skills than the men have had.

The issue is not that women do not possess the basic aptitudes, but rather that they have had little opportunity to develop these basic apti-

tudes. A study by the Human Engineering Laboratory of the Johnson O'Connor Research Foundation, found that many women have the aptitude to perform jobs that have been traditionally male-dominated. 1/ The same article cites assessments made utilizing the General Aptitude Test Battery (GATB) by the U.S. Employment Service, which reveal that out of the seven areas tested which are important to success in the skilled trades, there are no sex differences in two areas, women excel in four, and men in one. 2/

Evidence, therefore, exists that women can be trained to acquire adequate skills. However, manipulative skills are sharpened by continual use over time, and most women teachers who will participate will have had little time or occasion to develop their skills. The issue is, therefore, based on the variation of work experience required from state to state, the amount of time needed to permit a woman to prepare adequately for teaching, and whether that preparation must be acquired in a work experience situation, or can be acquired through other learning systems.

A variety of data has been examined to test the relevance of the existing time requirements for skill acquisition. The training time designated in the Selected Characteristics of Occupations in the Dictionary of Occupational Titles (DOT) 3/ was studied. Occupational titles were matched with vocational education courses, and all were matched with the number of years required to obtain skills adequate for entry employment in the identified occupations, which seemed a relevant level for the women to attain.

As the data in Table 2-a (p. A-9) indicate, many of the entry level occupations for trade and industrial courses require only one to two years to obtain entry level skills. Secondary school vocational teachers should need only the skills necessary to prepare their secondary school students with skills required of high school graduates for job entry. For those students who choose to go on to apprenticeship or postsecondary vocational programs to complete their training, their high school program should be able to provide them with sufficient skill and knowledge to assure access to that apprenticeship and/or postsecondary program. Teachers should not be expected to be prepared to teach at the level expected of a graduate of postsecondary school, or an apprenticeship program. It is essential that the number of years a woman needs to spend in a trade prior to entering teaching should never be any longer than is necessary to teach that level of skills.

1/ Hedges, Janice N. and Stephen E. Bemis. "Sex Stereotyping: Its Decline in Skilled Trades," Labor Monthly Review, May 1974.

2/ U.S. Department of Labor, Manpower Administration. Manual for the USTES, General Aptitude Test Battery, Washington, D.C., 1970. (Women excel in Form Perception, Motor Speed or Motor Coordination, Finger Dexterity, and Clerical Perception; men in Spatial Aptitude.)

3/ U.S. Department of Labor. Dictionary of Occupational Titles, 1965. Volume II, Occupational Classifications and Industry Index. Appendix B: Explanation of Worker Trait Components, p. 651; U.S. Department of Labor, A Supplement to the Dictionary of Occupational Titles, Third Edition, 1966.

Although work experience is a valuable training mode, expertise in a skill can be acquired in many ways, and not just through extensive years of work experience. Acquisition of skills in a classroom may be speeded up, particularly by using competency-based curricula. Therefore, alternative methods of acquiring skills are worthy of investigation as part of the program design.

Alternatives to supervised work experience that should be considered are:

- (a) Competency-based laboratory training utilizing postsecondary institutions.
- (b) Work experience gained through internship in the schools. (See Section III.B.)

The model might provide that women can work during the day while attending classes in the evening; or might work only in the summer; or any other suitable arrangement. The general calculation of work experience is evaluated on the basis of 2,000 clock hours being equivalent to one calendar year. Two years of credit may be given for one year's work through supervised on-the-job training in many states. It is, thus, possible that one year of work experience in industry may be sufficient to meet the requirements of skill acquisition, if coupled with classroom work and successful completion of the occupational competency test (where available).

Several studies conducted at the Pennsylvania State University have all found that more years of occupational experience do not necessarily make better vocational teachers. Kapes and Pawlowski conducted a study in 1974 in which they found a significant, positive relationship between numbers of college credits earned by teachers and achievement of their students in shop. Thus, they recommended that industrial experience be minimized as a criteria for teacher certification. 1/

A study was also conducted on current and former students in the Department of Vocational Education at Pennsylvania State University assessing the relationships between number of years of occupational experience with academic performance and occupational competency examination scores. 2/

1/ Kapes, Jerome T. and Vladimir Pawlowski. Characteristics of Vocational-Technical Instructors and Their Relationships to Student Shop Achievement. The Pennsylvania State University, Research Report, Vocational Development Study, Series Monograph, Number 17, University Park, Pennsylvania, 1974.

2/ Garner, C. William and Frederick G. Welch. "The Relevance of Work Experience to a Vocational Industrial Teacher Education Program," Journal of Industrial Teacher Education, Volume 13, No. 1, Fall 1975.

Based on analysis of the data collected, it was found that years of work experience had neither positive effect on academic performance nor on performance on an occupational competency examination. In view of these findings, the authors emphasized the need for a program which can train teachers over the short term, particularly in critical occupational areas. Individuals possessing the basic occupational skills, but without work experience, could apparently be provided skills with as little as one year of work experience.

Data from the National Center for Educational Statistics study of the characteristics of vocational education personnel in 1972 ^{1/} revealed that there were many more teachers of male-intensive occupations with little or no work experience than certification requirements would suggest.

Not only did 42% of the teachers of agriculture possess less than two years of non-teaching work experience; but 17% of the teachers of technical education, and 16% of the teachers of trade and industrial education had less than two years of non-teaching work experience.

Table B-1 1/

Percent Vocational Education Teachers ^{2/} by Teaching Area and years of Non-teaching Work Experience: 1972-73

Years Non-teaching Work Experience	Agriculture	Technical Education	Trade and Industry
None	36.5	8.6	10.6
Less than 2 years	5.7	8.2	4.9

SOURCE: National Center for Educational Statistics, Vocational Education, Characteristics of Students and Staff, 1972, p. 165.

Based on this data it is apparent that the requirement of non-working experience is decreasing, since it is the younger men vocational teachers ^{2/} who have the least non-teaching work experience. Thirty percent of the men under 30, 21% of the men between 30 and 44, and 11% of the men over 45 have less than two years work experience.

Table B-2 1/

Vocational Education Teachers ^{3/}, by Sex and Age: 1972-73

Years Non-teaching Work Experience	Male 30	Male 30-44	Male 45 +
None	17.3	16.6	9.9
Less than 2 years	13.0	4.8	1.4

SOURCE: NCES, Ibid., p. 162

^{1/} Data include vocational teachers of all levels--secondary, post-secondary and adult.

^{2/} These teachers are predominantly men.

^{3/} These men teachers teach in predominantly male-intensive programs.

However, it is important to note that 40% of the trade and industrial education teachers, and 24% of the technical teachers, as opposed to less than 1% of the agricultural teachers have not obtained a B.A. The models based on certification, (see Section II.A) describe the fact that all teachers of trade and industrial and technical education need work experience, but few require a bachelor's degree; whereas most agricultural teachers require a B.A. The NCES data confirms this.

Table B-3

Vocational Education Teachers, 1/ by Teaching Area and Highest Academic Degree Held: United States, 1972-73

Highest Degree	Agriculture	Technical Education	Trade and Industry
Bachelor's and above	99.4	77.2	59.4
Associate Degree	--	6.4	6.2
High School Diploma	.3	9.6	23.1
Other	.3	6.6	10.3
None	--	.1	.1
Not Known	--	--	.9

SOURCE: NCES, Ibid., p. 155.

This examination of some of the relevant data and research confirms the assumption that more teachers with short non-teaching work experience are teaching vocational education (see Table B-1) and that the group is expanding (see Table B-2).

The data also tend to confirm that no less than two years experience would be adequate for women undertaking a retraining program. When adding the time required to obtain courses in vocational education teaching, the model for trade and industrial teachers may still be infeasible for many women teachers.

Nonetheless, shorter term alternatives to providing skills necessary to secure certification warrant considerable further research. 2/ States that are already utilizing occupational competency tests are ones that could most readily undertake a pilot program to determine what method or combination of methods could most quickly produce the essential skills, based on occupational competency testing, rather than on years of experience. The potential results of such research would appear to be of sufficient value to justify Bureau of Occupational and Adult Education's (BOAE) funding such research project(s).

1/ Predominantly men teachers.

2/ An additional factor to be considered is that the entry of older persons with industry or military experience into positions as vocational educators means that their years of teaching service are likely to be comparatively short. This tends to continue the shortage of vocational education teachers. A model that would permit younger people to obtain adequate skill levels within two years would help alleviate this problem.

As an example of a State moving toward utilizing occupational competency testing for certification, it was learned that the State of Pennsylvania will be replacing time-based vocational teacher education activities with competency-based strategies, to the extent feasible. One of the features of the program is the utilization of occupational competency tests as a sole means of judging the occupational competency of vocational education teachers.

Occupational competency tests developed by the State as well as NOCTI may be used in assessing occupational abilities of the candidates. Passing the occupational competency examination will be regarded as conclusive evidence of "sufficient employment experience beyond the learning period," and of "adequate work experience beyond the learning period," as in accordance with State Board of Education Regulations. ^{1/}

B. Conceptual Retraining Model

Having discussed the issues of certification requirements, the characteristics of the women and the time required to attain skill levels, the parameters of the conceptual model can be defined, identifying the educational and occupational experiences required across the continuum. Although, theoretically, all women can be trained across all prescribed programs, the time constraints agree upon due to funding limitations eliminate certain components as being unreasonable for certain categories of women; it would simply take too long to be considered feasible. Figure B-2, on the follow page, sets forth each method of attaining certification for each of the five male-intensive vocational areas (trade and industrial, technical, agriculture, cooperative, and industrial arts). Issues discussed in the previous section could conceivably increase the possibilities that would make it more feasible for different classes of women to prepare for different vocational areas.

^{1/} Pennsylvania Department of Education, Bureau of Vocational, Technical and Continuing Education, Vocational Education Information Bulletin, April 28, 1977

Figure B-2. Conceptual Retraining Model*

Target Population	Method of Attaining Certification (Program Design)		
	Work Experience and Coursework (Non-Deg. Approach)	Bachelor's Degree and Work Experience	Bachelor's Degree
Secondary School Teachers		Agriculture; Cooperative; Technical. <u>1/</u>	INDUSTRIAL ARTS
Elementary School Teachers		Agriculture; Cooperative; Technical. <u>1/</u>	INDUSTRIAL ARTS
Women with A.A. degrees from postsecondary male-intensive vocational prog.	TRADE AND INDUSTRIAL Technical <u>2/</u>	TRADE AND INDUSTRIAL	Industrial Arts <u>4/</u>
Skilled women with work experience	TRADE AND INDUSTRIAL	Trade and Industrial <u>3/</u>	Industrial Arts <u>5/</u>

*Description of how model works is provided below.

- ☐ The boxed areas indicate that this program area might be feasible, but it depends on a great deal on the background of the women and the requirements of the respective state.

The following section details the program design that evolves from the Conceptual Retraining Model:

1. Program Design: Trade and Industrial Education

a. Non-Degree Approach

(1) The non-degree approach requires such extensive work experience beyond the learner's level that a program could not be designed feasibly within the two year time frame for teachers 6/ without previous skill experience..

1/ If teacher has sufficient mathematics and science courses as part of her undergraduate degree.

2/ If postsecondary training included technical courses.

3/ Realizing the importance of knowledge and life experience gained outside the campus, some universities are moving toward giving one to two years of college credit for successful performance on proficiency examinations such as the Collegel Level Examination Program (CLEP), College Entrance Examination Board, and Advanced Placement Program; sometimes in conjunction with work experience.

4/ Depending on content of postsecondary training.

5/ In states that will award a certificate in industrial arts to persons qualified for teaching trade and industrial education in the same skill area.

6/ "Teachers" refers to elementary and secondary teachers hereinafter.

(2) A program for skilled women who have the required years of work experience could be designed to provide coursework in teaching vocational education and could be completed within a matter of months. For skilled women who fall short of the required years of work experience, the program could include a sequence of appropriate supervised work experience in addition to the coursework, if the shortfall of experience is not too great. These women who have some work experience should be able to qualify readily within the two years.

b. Bachelor's Degree Approach

(1) Teachers 1/ would require a program that would permit them to obtain the required coursework in vocational education and the required work experience. They would have acquired many of the professional education courses required as part of their degree programs.

Between 50 and 60 hours of coursework is required to constitute a major in vocational trade and industrial education. A teacher would then have to complete an occupational learning period and sufficient work experience to qualify for certification. These requirements indicate that it would be almost impossible to design a program for teachers leading to certification by means of a degree program within two years. 2/

(2) Designing a degree program leading to certification of skilled women is feasible for women who have obtained associate degrees (A.A.) from two year postsecondary programs. A program designed for these women would consist of the coursework required to meet bachelor's degree requirements and could be achieved within two years (including the summer term) for participants carrying a full course load, if the educational institution grants course credit for their relevant work experience. This approach might be particularly attractive to skilled women because the combination of their years of work experience and having the degree would allow them to enter teaching at a higher salary level.

2. Program Design: Technical Education

a. Non-Degree Approach

Since most states require an associate degree or extensive work experience, the program design would be similar to that described in the degree approach requiring both coursework in technical subjects and supervised work experience. Whether such a program could be completed within two years depends on the background of the women entering the program.

b. Bachelor's or Associate Degree Approach

(1) A program for teachers would include the technical, mathematics and/or scientific courses that they are lacking and a supervised work experience component. It would be difficult to design a program that could be completed within two years; however, it would depend on the background of the participant. Those who majored in science or mathematics as an undergraduate with sufficient work experience might be able to complete the program within the time frame.

1/ Elementary teachers may need additional credits to teach at secondary level as described earlier.

2/ See Section II.A.3.

(2) Skilled women with postsecondary training would require a program that emphasizes teaching skills. Such a program should be able to be completed within two years. For those without postsecondary training, the program would also include additional technical courses as required.

3. Program Design: Agriculture

a. Non-Degree or Degree in Another Field Approach

(1) Secondary and elementary teachers would probably meet the education requirements toward a degree in agriculture in most states. It is possible in some states that an approved program could be designed consisting of a sequence of comprehensively planned and well supervised work experience that would permit a candidate to obtain the necessary competencies in agriculture within two years.

(2) A program for skilled women in agriculture who fall short of the occupational and/or educational requirements could be designed to provide those experiences within the two year time period.

b. Bachelor's Degree Approach

(1) Secondary teachers would require a program that would permit them to obtain the 40 to 54 hours of coursework in agriculture and agricultural education that constitutes a major in the field. The program would have to include a supervised work experience component in agriculture so that a participant could receive up to two years credit for one year actually worked. ^{1/} It would be possible for a candidate to complete such a program within the two year time frame by attending classes on a full-time basis for a year including summer school and working in a supervised work situation for a year, or working part-time in a supervised placement for two years, and spreading the class time over the same period.

(2) Elementary teachers would require a program similar to the secondary teachers, but might be required to complete additional coursework to qualify to teach at the secondary level. To the extent that this is a factor, it might prohibit the design of a program that could be completed within two years. However, this is a point that might be negotiated between the state certification officials and the educational institution personnel to give credit for past teaching experience and coursework, even though it was at the elementary level.

(3) This approach is appropriate for skilled women only if they have had two years of postsecondary training/education. With a postsecondary background, a program could be designed to provide the coursework necessary to obtain a bachelor's degree within a two year period. Without that postsecondary background, the program would take longer than two years.

^{1/} Credit could also be given to those who have work experience or have lived on the farm.

4. Program Design: Cooperative Education

a. Non-Degree Approach

There is no non-degree approach to certification in cooperative education, except that certified trade and industrial education teacher with the required years of teaching experience who could then qualify for a cooperative education certification.

b. Bachelor's Degree Approach

(1) Teachers would already have earned the bachelor's degree required for certification. Some states require teaching experience which re-entering women would have had. Diversified cooperative teacher requirements recognize a wide range of work experience for certification, it is not unlikely that many of the teachers would have worked in a non-teaching area, either while attending college or after college, particularly if they have had difficulty finding employment in teaching. For those teachers with little or no work experience, a program for teachers as diversified cooperative teachers, would have to provide the work experience in industry necessary to qualify for certification. For industrial cooperative teachers which require that work experience be in a related occupation, the program would have to provide work experience in the appropriate male-intensive occupations, the length of time to be invested in a supervised work experience could be completed within a year. At the same time, courses would be provided in occupational analysis, coordination and administration of cooperative programs, and history and philosophy of vocational/technical and career education. This program could easily be completed within two years.

(2) Since cooperative education requires a bachelor's degree, a program for skilled women could be developed only for those who had two years of postsecondary training or in universities that grant two years college credit for successful performance on proficiency examinations. The program would provide the coursework necessary for the women to obtain a bachelor's degree. Since these women are likely to have fulfilled the work experience requirements prior to entering the program, this program could also be completed within two years for participants attending classes on a full-time basis. It would not, however, be feasible for skilled women in the states that require previous teaching experience, or women with no postsecondary education, or states that do not give credit for work experience.

5. Program Design: Industrial Arts

a. Non-Degree Approach

There is no formal non-degree approach to certification as an industrial arts teacher. However, it is possible in some states (Ohio, for example) for a teacher to teach industrial arts courses in the skill area in which the individual is qualified as a trade and industrial education teacher.

b. Bachelor's Degree Approach

(1) A program for teachers would provide the 30 to 42 semester hours of coursework to fulfill the requirements for an endorsement or major in industrial arts. Teachers will have met all other degree requirements; however, elementary teachers may need additional coursework to teach at the secondary level (9-12 semester hours) depending on the state and/or their background. By taking a full course load, a participant could complete the requirements for certification within two years.

(2) A program for skilled women with a two year postsecondary degree would provide the coursework necessary to earn a bachelor's degree with a major in industrial arts. Depending on the coursework taken as part of the two year program, it may be possible to complete the program within two years if attending classes on a full-time basis, including summer programs.

For skilled women with no postsecondary experience, pursuing certification as an industrial arts teacher would require a four year bachelor's degree program; in universities that grant two years college credit for successful performance on proficiency examinations, such a program might be completed within two years. On the other hand, skilled women who obtain trade and industrial certification could use this certification to teach the skill area in industrial arts and pre-vocational programs.

III. Handbook: Guidelines for Implementing a Model Retraining Program

The previous chapter discussed the conceptual framework of the Retraining Model. This chapter takes the next step by providing the prospective sponsor of a program with a more detailed plan for the development and implementation of such a program.

Section A describes the planning issues and activities that must be addressed prior to actual recruitment of participants and program implementation: Does the State have a need for vocational education teachers? In what program areas are there needs? Where will the State get funds to support the project? With whom must one consult to assure acceptance and approval of the project?

Once these issues have been explored, the actual development of the program design can take place. Section B describes the various components to be considered in designing programs in trade and industrial education and industrial arts. It is designed to assist educational institutions to address such things as: What courses will have to be provided? How can competency-based programs be successfully utilized? What work experience or simulated work alternatives need to be explored? For how long a period should the program be planned?

Once the program design issues have been resolved, an educational institution can move toward implementation. Section C addresses the supportive activities to be provided to insure a successful project: How to recruit participants? How to select candidates most likely to succeed? What counseling services will be required? How should university faculty and school and industrial personnel be prepared for the program? What type of placement services will be needed?

A. How to Plan

1. Issues in Planning

In planning a program for retraining unemployed women teachers and skilled women to teach in male-intensive vocational programs, the prospective sponsor must take into consideration a variety of issues: the certification requirements, the qualifications of the women who are selected to participate, the required work experience, the manipulative and teaching skills that must be acquired by the women. The program must be able to recruit women, select those that are appropriate for the teaching positions for which they are being prepared, and assure that essential supportive services are available. Support must be gained from the university to facilitate smooth development and implementation of the program. Additionally, efforts must also be made to assure that staff at the university responsible for administering the program and teaching the courses, personnel in the schools where participants are placed, and supervisors in industries where participants are to gain work experience, are attuned to the issues so that their actions and attitudes are absent of sex stereotype and sex bias. In responding to these issues, the prospective sponsor must consider the aspects that are unique to this program and the women it plans to train to become secondary male-intensive vocational teachers.

In order to support all essential components, a university must be assured that funding will be available, recognizing that suitable components of a training program for these selected women will be more costly than the programs that they are accustomed to operating. An important aspect of this issue concerns the timing of the program. Since annual federal funding cycle usually begins in October, while university calendars generally start earlier, in September, it will be essential for the program to be planned ahead to assure that the state and federal fiscal cycle coincide.

Input from an advisory committee involving all interested parties--Local Education Agencies (LEA's), State Education Agencies (SEA's), State Vocational Education Agencies, teacher's educational associations and unions (such as the American Vocational Association, American Industrial Arts Association, National Education Association, American Federation of Teachers, and others), employers, women's groups, and participants--can also be extremely valuable in planning and implementing a retraining program. (See Section III.A.4.)

All of these issues must be addressed during the planning, development, and operation of the overall program. Adequate time must be allowed to plan the training program and to consider choices of staff and curricula, and to define the characteristics of the women who will be selected. Whenever possible, both the staff and representatives of prospective participants should be involved in these planning activities. Unique aspects of this program and its target population which are to be borne in mind include the following:

(a) Scheduling and Location of Classes

The needs of adult women vary, and may require that the women be provided a choice of class times. Depending on whether or not day care services are available, those who have pre-school children may prefer classes in the evening or on weekends, when another adult is available for babysitting. Those with older children may want their classes scheduled during the day, when their children are in school. Not only the time, but also the place that courses are offered is important, since the participants will likely not live on campus and frequently will have to commute some distance to attend a class. Thus, classes that meet four or five days a week for one hour are generally less convenient than are longer sessions that meet once or twice weekly. Each group of women will have somewhat different needs, and the programs developed by the pilot projects should respond to their differing needs. Part of the problem may be solved by utilizing the competency-based approach, where self-paced, individualized instruction is stressed, if instructors are able to respond flexibly to the time/place needs of the women.

(b) Family Demands and Need for Financial Assistance

Many of the women returnees may have family demands which will permit them to participate only on a part-time basis. Women participants who prefer to extend the time it takes to prepare themselves for re-entry should be able to obtain a prorated stipend. Some of the re-entrants are

likely to be single heads of households and will need more financial assistance than is provided by the legislation. Unless they are able to earn more than the stipends provided by this program, some women may not be able to afford childcare, adequate transportation, or even may be unable to participate. The project may have to seek other sources of funds for this small group.

The state or the educational institution should try to be flexible to respond to the differing resource needs that are likely to arise among the target population of this program.

(c) Need for Childcare

Women who have been working or have recently completed their education are likely to have solved whatever childcare or transportation problems they may have and are not likely to need this type of assistance. Those women returning to the labor force may, however, need assistance in locating such facilities. One of the critical factors to be decided by the project will be whether or not, based on the characteristics of the women who will be participating in the project, it would be appropriate to include childcare services as part of the project. (See Section III.C.5.)

(d) Need for Counseling

The returning teacher may share the problems of other women re-entering the labor market after career interruption for childrearing and homemaking. Reintroduction to the world of work is difficult enough, but where the woman is preparing to enter a career where her students and her fellow teachers are likely to be predominantly male, the complex of problems to be faced may require group or personal counseling. Every project should seek suggestions from the women who participate as to what they see as their difficulties and needs, and determine ways to resolve them.

Women should be involved in a group process where experience has shown that the participants can often find support from each other, and that peer support and counseling is often the key factor in problem-solving. Where possible, husbands and men friends should also be included on occasion to reduce problems at home. (See Section III.C.3.)

(e) Staffing of the Program

To assure efficient operation of the program, it is essential that the personnel involved be experienced in all aspects of the issues outlined in this Handbook. The director of the program must be familiar with the male-intensive vocational areas, particularly in the skill areas in which the women are to be trained. In view of the special needs of the pilot program, the director should be familiar with the university and with the staff relevant at the State Vocational Education Office. S/he must also be experienced in certification issues in order to deal effectively with SEA's, LEA's, and other state or local educational personnel involved (see Section III.B.4).

There should also be a part-time group counselor to provide guidance to the group counseling sessions. For this reason, it is recommended that

an individual sympathetic to their needs, and familiar with the various backgrounds of the women, as well as experienced in group processes be involved.

Where women will be placed on supervised work situations, services of a staff person who is experienced in industry should also be obtained.

Depending on the number of women recruited into the program, an appropriate number of faculty members to supervise placements in industry or school should be available. A teacher/student ratio of 1:12 or 1:15 would be suitable.

2. Determining the Need for a Retraining Program in a State

The section following this one on possible funding sources will highlight the fact that a retraining program responds to the purpose and intent of the vocational legislation as a means of reducing sex bias and sex stereotyping. This section provides data on the need for teachers in the male-intensive vocational programs by state, and discusses how to identify where the need for such a program is greatest. National data may provide general trends, but state data will provide more specific and useful guidance. The crucial questions for a state (or a university within a state) to consider are:

- What are the major secondary school male-intensive programs with the highest enrollment rates in the state? (See Tables 3-a and 3-b on pp. A-10 to 13.)
- Which of those programs are projected to expand? (See Table 1-b on pp. A-2 to 4.)
- Are there programs in the state where there is an apparent imbalance between the number of students and the number of teachers? (See Tables 3-a, 3-c, 3-d and 3-f on pp. A-10 to 13, A-14 to 16, A-17 to 20, and A-22 and 23.)
- Is there a known undersupply or projected shortage of teachers in specific programs in the state? (See Table 1-a, and 3-e on pp. A-1 and A-21.)
- Has the state described a particular emphasis on policies for eradicating sex discrimination in vocational education in its State Plan as required by the Office of Education Regulations? 1/
- Is there an expected expansion in employment in the male-intensive occupations for which training can be obtained through secondary school vocational programs? (See Table 3-i, pp. A-28 to 30.)
- Is the existing number of teachers employed in a program area of significant size to warrant undertaking a program? (See Table 3-g, p. A-24.)

1/ U.S. General Services Administration, Office of the Federal Register. Federal Register, Volume 42, April 7, 1977, §104.187.

- What vocational programs in the state that are male-intensive nationally have a higher percentage of women in the programs than the national average (indicating a good climate for the program area in the state), or markedly lower percentage (indicating that further effort is warranted in that program area)? 1/ (See Table 3-h, pp. A-25 to 27.)

It is important to select those male-intensive areas where good employment opportunities can be projected for women who complete the training program, so that women who do undertake the training will be assured of employment on completion of their training. The following sections along with the tables in Appendix A provide states with the detailed data on which to make its preliminary decisions.

Trade and Industrial Education

With the possible exception of industrial arts where data are inadequate and in the few agricultural states where employment priorities are invested in agri-business, enrollments in trade and industrial education are by far the largest among male-intensive vocational programs. (See Table 3-a, pp. A-11 to 13.)

In view of the tremendous growth in enrollment in recent years, as well as the projected growth in trade and industrial employment, it is likely that most states would find a retraining program in this area feasible. National 1975 data on secondary school male-intensive vocational enrollments indicate that 54% of all students (men and women) are enrolled in trade and industrial education programs. 2/ Twenty-eight thousand teachers were so employed.

Some of the states that offer extensive courses in this program area include: Illinois, California, New York, Florida, Pennsylvania, Texas, North Carolina, New Jersey, Ohio, and Michigan. All of these states project increases in enrollment in trade and industrial education, but most other states have a demand for at least a few of the trade and industrial detailed classifications. (See Table 3-a, pp. A-10 to 12.)

The courses that are most likely to warrant inclusion in a state program include: auto mechanics, drafting, metalworking, electronics, and carpentry. Other construction and maintenance and graphic arts are also large, but the number of jobs are likely to vary and may be tight in some states.

Technical Education

Technical education is offered almost exclusively at the postsecondary level. Technical education enrollment at the secondary level accounted for only 8% of vocational enrollment nationally in 1975. 3/ During 1975 and 1976, only 22 states offered any courses in male-intensive technical programs at the secondary level; persons enrolled in these courses represent less than 20,000 students nationally. (See Table 3-a, pp. A-10 to 12.)

1/ Caution should be exercised in evaluating various data and projections. During the course of the data analysis, observation indicated that data collection methods of most states leave much to be desired as to their accuracy and equatability.

2/ 6.0% of male-intensive trade and industrial students are women. Cooperative education is not independently reported and industrial arts is seriously underreported (see Section on Industrial Arts).

3/ Based on FY75 State Annual Reports to U.S. Office of Education.

Seven states offering secondary school technical education are projecting demands for five or more teachers of technical education (Colorado, California, New Jersey, North Carolina, Pennsylvania, Texas, and New York) (Table 3-e, pp. A-21). These six states (North Carolina reports no demand for teachers at present) account for 78% of all technical teachers. Even in these states, however, enrollment in technical education is by no means significant when compared to other occupational areas. For instance, Pennsylvania's technical courses (which is the largest single state program) represents only 1% of the state's secondary school enrollment. Technical education offers little placement opportunity for women unless a major expansion of these programs are to be undertaken at the secondary level. (See Table 3-i, pp. A-28 to 30.)

Both California and Pennsylvania are projecting a demand for approximately 19 new teachers (excluding those projected to be filled through pre-service programs) for both 1978-79 and 1979-80. (See Table 3-e, pp. A-21.) Considering the large number of school districts in California and Pennsylvania, identifying these 19 among the numerous school districts in which there is likely to be a demand, may be equivalent to seeking a needle in a haystack.

Agriculture

The teacher shortage in agricultural programs is so critical that it was addressed by the Agricultural Education Division during the 1975 annual convention of the American Vocational Association. It was pointed out during the convention that 78 vocational agriculture programs in secondary schools across the nation could not operate in 1974-75 because of teacher shortages. Although the issue was underscored, in the following year, the number of programs in vocational agriculture without teachers had grown to 131. ^{1/}

Demand for vocational agriculture programs continues to be strong among the food producing and processing states. Fourteen states each with more than 15,000 enrollees accounted for approximately 63% of the secondary male-intensive agricultural enrollments; these states include Texas, California, Georgia, Illinois, Ohio, Washington, Louisiana, North Carolina, Iowa, Arkansas, Tennessee, Wisconsin, Oklahoma and Missouri. Based on FY 1977 state plans, Florida is the only state projecting a continuing substantial increase in demand for agricultural teachers through 1980. As long as a state projects a continuing high enrollment in this area, a retraining effort focusing on training women to teach vocational agriculture would be feasible. Washington, for example, reports that 79% of its total secondary school male-intensive enrollments are concentrated in agriculture; therefore, this might be the only area in which the state could support a program.

Cooperative Education

Although cooperative education programs are widely recognized as one of the most effective learning experiences, enrollment continues to be low in most states. Only in distributive education is there a significant percent-

^{1/} "Ag Educators Examine Programs," American Vocational Journal, February 1977.

age enrolled in cooperative programs (23%). Teachers of cooperative education tend to be male in male-intensive programs and female in female-intensive programs, 1/ and male in diversified programs. Among the male-intensive program areas, 3.7% of the students in agriculture, 2.0% in technical education and 4.6% in trade and industrial education are enrolled in cooperative programs. In 1973, cooperative programs accounted for only 4% in vocational education. However, at a time when the costs of equipping vocational shops are spiralling, cooperative programs are an attractive way for increasing learning opportunities without incurring large capital and equipment costs. For these reasons, cooperative programs are expected to grow and result in the need for more teachers in this area; whether the expansion will be in male-intensive cooperative programs has not been determined, however. Nonetheless, expansion trends at the local level warrant investigation, particularly for the diversified programs.

Industrial Arts

Although industrial arts has been legally included as part of vocational education since 1972, 2/ there is still a lack of consensus among state vocational personnel as to the validity of including industrial arts as a vocational subject.

It is certain that not all industrial arts enrollments are being reported in vocational education enrollments. For FY 1975, only 19 states reported enrollments in this area to USOE, although industrial arts is offered in practically every school system in the country. To illustrate the point, a total industrial arts enrollment of 367,462 secondary students was reported nationally in 1975. Pennsylvania did not report any industrial arts enrollment to the federal government under its vocational program for that year. However, based on its FY 1977 State Plan, Pennsylvania reported a secondary school enrollment of 386,787 in industrial arts--a number exceeding the total reported nationally.

Even in those states which reported data for industrial arts, the accuracy of that data is often questionable. For example, New York did not report any enrollment; however other data provided by the New York Department of Vocational Education indicated there were 9,800 industrial arts teachers assigned in 1976. Because of the lack of data at the state level, and in view of the inconsistencies where it is reported, a precise analysis of industrial arts enrollment is not possible. Until better data are reported, a university or state considering a retraining program in this area would be well advised to obtain more precise data at the local level to determine the extent of demand for teachers in this field. (See Tables 3-a and 3-b, pp. A-10 to 13.)

From all indications, however, it appears that industrial arts teachers are in demand, and that enrollments are expected to increase. Among the 24 states which projected demand for industrial arts teachers in their FY77 state plans, most expected a need for additional teachers beyond those that were expected to become available through pre-service programs.

1/ Based on FY75 State Annual Reports to U.S. Office of Education, and computer data received from the individual states.

2/ According to Vocational Education Act of 1963 as amended in 1972.

Thirty-five or More Teachers in a Detailed Classification in the State

Based on 1975-76 data, secondary male-intensive vocational programs that employ 35 or more teachers have been identified. These are the program areas where there are likely to be enough demand for teachers, to warrant inclusion as part of the pilot program. (See Table 3-g, p. A-24.)

The programs appearing most frequently in which there are at least 35 teachers in the state are agricultural production, agricultural mechanics, auto mechanics, machine shop, drafting, welding, other construction and maintenance, body and fender, and graphic arts. The states in which these programs have at least 35 teachers appear in Table 3-g (p. A-24).

The Table does not include industrial arts or cooperative education, which are very likely to have more than 35 teachers and could swell the number of possible program areas. Of all 27 states reporting industrial arts teachers, all but one have more than 35 teachers and states often reported as many as 200 teachers.

Percent Women Enrolled in Male-Intensive Vocational Programs

National enrollment data show that women comprise 6% of the total enrollment of male-intensive trade and industrial secondary vocational programs; women are 7.5% of all male-intensive programs. By analyzing the enrollment data for each state by sex, and comparing the percentage of women in each state to the percentage of women nationally, those states where women have been moving into male-intensive programs can be identified. (See Table 3-h, pp. A-25 to 27.) Some states have made a greater effort than others to move women into the male-intensive programs. States that have exerted an effort to overcome traditional sex stereotyping in vocational education can be expected to be responsive to a project that would retrain women teachers who could serve as role models to young women students and could reach out and encourage women students to participate in male-intensive training.

Analysis was undertaken of those states above and below average. Five states are 2.5% above the national average in both all male-intensive and trade and industrial male-intensive enrollment: in descending order they are: Utah, Wyoming, Nevada, Wisconsin, and Washington. 1/ Seven states are 2.5% below the national average in either all male-intensive programs and are: New Jersey, Louisiana, Alabama, Alaska, Ohio, Kentucky, and New York. 2/ Altogether, nine states are above average, 20 states below average on at least one characteristics.

1/ Additionally, states that are above on all male-intensive programs include: New Mexico and Oregon; states above on trade and industrial male-intensive programs include: Georgia and North Carolina.

2/ Additionally, below on all male-intensive include: District of Columbia, Maine, Oklahoma, South Carolina, Tennessee, and West Virginia, below on trade and industrial male-intensive include: Arizona, Idaho, Nebraska, New Hampshire, South Dakota, and Virginia.

Utah is a unique situation with enrollment of women in male-intensive training twice as high as that of the next highest state. ^{1/} Utah reports extremely high percentages of women enrolled in all male-intensive vocational areas; women account for 41% of secondary school male-intensive agricultural programs, and 45% of industrial arts enrollment. Women in Utah were well represented in all male-intensive trade and industrial categories, except machine shops--where only 3% of the students were women, precisely at the national average.

Of the states showing positive gains, only Nevada and Wisconsin, in addition to Utah's phenomenal record, show a healthy gain across the board. Most of the other states show a rise in one or two classifications, such as drafting and graphic arts. For those high in all male-intensive occupations, a high percentage enrolled in agriculture seems to be the key factor.

Table C-1. -- Percent Women Enrolled in All Male-Intensive and Trade and Industrial Secondary Male-Intensive Courses

States with Highest Percent of Women Enrollment			
All Male-Intensive		Trade and Industrial	
National	7.5		6.0
-----		-----	
Utah	40.0	Utah	23.2
Wyoming	15.0	Wyoming	12.6
Washington	14.3	Nevada	12.5
Nevada	13.0	Wisconsin	10.5
Oregon	12.0	Georgia	8.7
New Mexico	11.8	Washington	8.6
Wisconsin	10.2	North Carolina	8.5
States with Lowest Percent of Women Enrollment			
New Jersey	1.9	Idaho	1.4
Louisiana	3.0	New Hampshire	1.5
Alabama	3.0	New Jersey	1.7
Oklahoma	3.1	South Dakota	2.0
Tennessee	3.3	Ohio	2.7
Alaska	3.4	Louisiana	2.8
DC	4.1	Virginia	3.0
West Virginia	4.2	Nebraska	3.2
Ohio	4.3	Arizona	3.2
Kentucky	4.4	Kentucky	3.2
Maine	4.5	Alaska	3.3
South Carolina	4.7	Alabama	3.3
New York	5.0	New York	3.4

^{1/} Data are not available on the number of women teachers in the male-intensive occupations, but the information would be interesting to determine whether this has contributed to Utah's unusual record.

For states with low percentages of women enrolled in male-intensive occupational programs, special efforts need to be exerted to recruit more women into male-intensive programs, and particularly in removing sex stereotypes. One way of achieving this is by providing women to teach male-intensive courses, at the same time charging them with the responsibility of recruiting more young women into male-intensive training.

Data Problem Areas

It cannot be overemphasized that caution must be exercised when utilizing State Plan projections on teacher demand. Where some states may have underestimated their teacher demand, there are certainly some others that may have overestimated it.

What is suggested is that states may not be able to plan realistically or determine the need for a particular training program, if they depend exclusively on projections contained in State Plans. While a state or university should not train teachers for whom there is no demand and should take teacher shortages into consideration, neither should they overlook other data, such as that reported in this Handbook which indicate that the State Plans may have misjudged the State's need for vocational teachers.

One sign that error may exist is the ratio between student enrollment and teacher employment. An unusually high ratio would indicate that further data are needed to judge the demand for more teachers in that area. One problem with this reasoning is that some states report two or three class hours as a single vocational program and others report in units by single class hours. National data, however, should average this out; if the data reveal unexplained variants for the state, it warrants further investigation. (See Table 3-f, pp. A-22 and 23.)

Trade and Industrial Education

Based on national enrollment and teacher employment data for 1975, the average ratio of students to teacher is estimated at 37:1 (see Table 3-f, pp. A-22 and 23). Whereas the student teacher ratios for most of the states are close to the average, a few states have extremely high ratios. Whatever the reasons for these high ratios, they warrant further investigation to determine the validity of the data.

For example, Nebraska, with its student/teacher ratio of 95:1, would appear to need additional personnel. However, based on its State Plan projections through 1979-80, only 25 additional teachers beyond the 12 expected through pre-service are all that the Plan proposes to be needed to meet the demand. This projection seems extremely low, if the rapid increase of enrollment expected in trade and industrial education is also taken into consideration. California is another example of a state with very high student/teacher ratio for trade and industrial occupations--90:1. It has, however, projected a substantial increase in additional demand for trade and industrial personnel. Based on the data available, the other states that have unusually high ratios of students to teachers in trade and industrial education are: Wisconsin (90:1), Hawaii (87:1), District of Columbia (80:1), and Utah (68:1).

Another example of the problems inherent in exclusive reliance on projections from State Plans is contained in the following Illinois example. Analysis of data show that in FY76, 2,942 (F.T.E.) 1/ teachers were employed in secondary male-intensive trade and industrial education courses in Illinois. 2/ However, according to its FY77 State Plan, the total unduplicated number of staff required for trade and industry at all levels (secondary, postsecondary, and adult) was indicated as 1,412, or 55% less than what was reported for FY76. At the same time, total enrollment of secondary trade and industrial courses increased from 180,428 in FY75 to 185,094 in FY76. To further confuse the issue, the FY77 State Plan indicated a drop of secondary trade and industrial enrollment to 76,014-- or a drop of 60%. Logically and realistically, such a dramatic drop could not have been possible during the course of a year, and data derived from the State Plan must be suspect.

Industrial Arts

For those states which project an oversupply of teachers in industrial arts, a closer examination of the data reported may also be required. Mississippi, for example, with a student/teacher ratio of 99:1, is projecting an oversupply of 2 and 5 industrial arts teachers, respectively, for 1979 and 1980. Supply through pre-service teachers, where a bachelor's degree is required, are projected at only 38 for FY 1978 and 43 for FY 1979.

Florida, Georgia, Kentucky, Maryland, New Mexico, North Carolina, Pennsylvania, and Virginia all report a student to teacher ratio over 100:1 and Florida, the highest, reports 168:1. Florida projects the third highest need for industrial arts teachers (see Table 3-e, pp. A-21). but Georgia, Kentucky, North Carolina, and Pennsylvania project a very low demand.

Similar analyses can be made for the agricultural and technical occupations. (See Tables 3-e and 3-f, pp. A-21 to 23.)

1/ Full-time equivalent.

2/ Data for 1977 based on FY77 State Plan. The total number added up to 3,122 if secondary teachers of non-male-intensive courses were included.

3. Funding Sources

In planning a retraining program the first issue to be addressed is where will the financial resources come from to support such an effort. A major purpose of the Vocational Education Act (Public Law 94-482) is to assist states to develop and carry out programs to overcome sex stereotyping and sex bias in vocational education programs and thereby furnish equal educational opportunities in vocational education to persons of both sexes. Additionally, Title IX of the Educational Amendments of 1972 specifically prohibits sex discrimination in institutions of vocational education that are recipients of federal education funds. 1/

This section describes the provisions of the vocational education regulations that provide funds on a national basis and through states which can be utilized to support a retraining program, stipends for participants, and other essential supportive activities. 2/

(a) Funds Available on a National Basis--Commissioner's Discretionary Programs of National Significance for Vocational Education 3/

Under this part, the Commissioner can fund projects of national significance for improving vocational education; the projects can be: research, exemplary and innovative, personnel training and grants to assist in overcoming sex bias, among others. An estimated \$27 million will be available for these programs. Of this amount, \$13.5 million will be for research and demonstration projects, and \$1.6 million for curriculum development. 4/ These projects must show evidence that they will be used in a substantial number of classrooms. Applications for these projects will be received competitively against specific weighted technical criteria. If the Commissioner indicates interest in the model, several pilot programs could be funded placing emphasis on different aspects of the program or could test the same model under different local conditions.

Certification Fellowship Program

Another program that comes under the Commissioner's discretion is the vocational education certification fellowship program 5/ which is designed to provide opportunities for:

- a. Certified teachers who have been trained to teach in other fields to become vocational educators if those teachers have skills and experience in vocational fields for which they can be trained to be vocational educators; and

1/ §36.35, Federal Register, Volume 40, Number 108.

2/ All sources of funding described in this handbook are based on P.L. 94-482 and the proposed regulations dated March 31, 1977, and published in the Federal Register on April 7, 1977. Final regulations are not yet available as of June 30, 1977.

3/ Part 105, Federal Register, April 7, 1977.

4/ This figure does not include additional funds which have been approved by Congress

5/ §105.431, to 105.443, Ibid.

- b. Persons in industry, business, and agriculture who have skills and experience in vocational fields for which there is need for vocational educators (but who do not necessarily have baccalaureate degrees) to become vocational educators.

Approximately \$3.5 million dollars has been specifically allocated for this undergraduate program (which is not to be confused with the graduate level Leadership Development Award Program). Persons selected for such fellowships are entitled to stipends of \$4,500 for up to two years (as well as allowances for subsistence and other expenses for the person and his/her dependents) for each academic year and \$900 for each summer session. Additional funds are provided for persons with dependents. Under this fellowship program, the educational institution which a recipient attends, receives an institutional allowance of \$2,000 for the academic year and \$500 for the summer session. 1/ Being a national program, there will be no matching involved for programs funded under this part.

These fellowships are to be apportioned equitably among the states taking into account such factors as vocational education enrollment and the incidence of youth unemployment and school dropouts. The criteria to be utilized in reviewing applications are: (1) academic ability (20 points; transcripts, results on skill aptitude or other tests); (2) vocational skills (30 points; recommendations, NOCTI, certificates, related work experience); (3) communication skills (25 points; public speaking, articles); (4) human relations skills (15 points; professional, community and volunteer groups, members of minority groups, disadvantaged and handicapped); and (5) national need (10 points; applicant's goals and objectives with particular reference to working with disadvantaged, minority, and handicapped persons). Additionally, the Commissioner will consider equitable distribution among males and females, geographic distribution and membership in minority groups.

It is also possible that because the elimination of sex discrimination is a major purpose of the vocational education legislation, the Commissioner will give priority to women within a state who are recommended by the State Department of Vocational Education and State Advisory Council, to participate in such a retraining program.

(b) Funds Available through the States 2/

Funds are available under Subpart 2--Basic Grants, which represents 80% of the federal funds allocated to the state and under Subpart 3--Program Improvement and Supportive Services which represents the remaining 20% of federal funds to states. Although matching funds are required for certain activities from these funds, it is stipulated in Public Law 94-482 that from sums made available to the states, the Commissioner shall pay 100 percent of the cost to support activities which show promise of overcoming sex stereotyping and bias in vocational education. 3/

1/ §105.431 to §105.443, Ibid.

2/ Part 104, Ibid.

3/ Sections 111(a)(1), 130(b)(5 and 6), 135 and 136; Public Law 94-482.

The activities and components of a retraining program which can be supported under each Subpart are described below:

Basic Grants to State Vocational Education Programs

Each state is required to allocate \$50,000 for full-time personnel whose responsibility is to work toward eliminating sex discrimination and sex stereotyping and insuring equal educational opportunities for both sexes. 1/ Some of the functions assigned to this personnel include working to:

- a. Assist local educational agencies and other interested parties in the state to improve vocational education opportunities for women.
- b. Develop and support actions to correct problems brought to the attention of this personnel through activities carried out in eliminating sex discrimination and sex stereotyping from all vocational education programs. 2/

In addition to funding the activities of full-time personnel assigned to these tasks, funds may be utilized to support studies that would facilitate carrying out these functions. 3/

Since this program supports these activities, writing the program into the state plan would place the state on record in support of these objectives as required by the regulations. 4/ The rationale for mounting a retraining model which was described in Chapter I clearly justifies the need for such a program as a means of overcoming past stereotyping by sex which is reflected in the existence of male-dominated vocational program both among students participating in and teachers conducting these programs. The retraining model offers a state an opportunity to demonstrate its effort to reduce future sex stereotyping by providing female role models in traditionally male-dominated vocational programs to encourage the participation of young women in these programs.

Under §104.621, funds can be used by a state to provide vocational education programs for the following special groups:

- (a) Persons who had been homemakers but who now, because of dissolution of marriage, must seek employment; 5/
- (b) Persons who are single heads of households and who lack adequate job skills;

1/ §104.74, Ibid.

2/ §104.502, Ibid.

3/ §104.76, Ibid.

4/ §104.161 and §104.187, Ibid.

5/ May be re-entering women.

(c) Persons who are currently homemakers and part-time workers but who wish to secure a full-time job, 1/ and

(d) Women who are now in jobs which have been traditionally considered jobs for females and who wish to seek employment in job areas which have not been traditionally considered as job areas for females. 2/

The target populations of a retraining program fall within these special groups; all three sections except (b) could appropriately be utilized to support a project to train women to become male-intensive vocational educators.

The supportive services for women which can be provided by basic grant funds include counseling, job development (placement services) and job follow-up supports (university oversight of work sites). 3/ Section 104.603 of the supportive services for women is directly targeted at funding programs similar to this retraining model:

§104.603. In funding programs and activities of support services for women, funds may be used to increase the number of women instructors involved in the training of individuals in programs which have traditionally enrolled mostly males, so as to provide supportive examples for these women who are preparing for job in these non-traditional areas of employment. (Underlining added.)

Subpart 3--Program Improvement and Supportive Services

The purpose of this Subpart is to improve vocational education by providing funds to the states through their vocational education Research Coordinating Units (RCU) to support research programs, exemplary and innovative programs and curriculum development programs. 4/ Funds can be used for projects that are pilot in the state as part of applied research and development that show promise of overcoming sex bias and sex stereotyping. 5/ In addition, priority is given to exemplary and innovative programs that are designed to accomplish the same purpose. 6/

1/ May be substitute teachers.

2/ Elementary school teachers.

3/ §104.602, Ibid.

4/ §104.702, Ibid.

5/ §104.705, Ibid.

6/ §104.706, Ibid.

Funds are also available for:

(c) Development and dissemination of curriculum and guidance designed to overcome sex bias in vocational education programs.

(d) Support services designed to enable teachers to meet the needs of individuals enrolled in vocational education programs traditionally limited to members of the opposite sex. 1/

The support services component of the retraining program described in Section C of this Chapter are geared to the purposes described in the Sections of the regulations cited above.

In case all of these sources of funding are not sufficient, the states may make grants under §104.792 to support activities which show promise of overcoming sex bias and sex stereotyping in vocational education.

Under the same source, funds may be used for projects such as:

(a) Research projects on ways to overcome sex bias and sex stereotyping in vocational education programs;

(b) Training to acquaint guidance counselors, administrators, and teachers with ways of:

(1) Effectively overcoming sex bias; and

(2) Assisting girls and women in selecting careers.

Clearly the retraining model would assist in meeting these objectives. Pre- and post-data collection on the participants will permit an evaluation research design. (See Section III.A.5.) Exemplary programs can also be developed for counselors and teachers participating.

Packaging the Program

Packaging the program piece by piece will be extremely difficult; it will be much simpler if the State Department of Vocational Education itself decides that the program has validity, and works with the university to obtain funds under the (National) Commissioner's Discretionary Programs and/or to assign funds from its basic grants, and program improvement and supportive services funds, to pay for the costs of the program. In view of the (previously described) numerous sources of funds available, it is most likely that a well-packaged program will be able to obtain adequate resources to cover all the costs of the program. §105.439 actually states, for the nationally run vocational education certification fellowship program, that "Any portion of the institutional allowances in excess of the normal tuition, non-refundable fees, and deposits attributable to the fellow shall be used by the institutions to improve the program of vocational education in that institution."

1/ §104.708, Ibid.

In putting together such a program a university should take into consideration how to best package all the essential components: the number of fellowships that are likely to be available to the state, the percentage of fellowships awarded to a state that could be awarded to women participating in the retraining project, and the number of women that the project could realistically handle. A university, together with the State Department of Vocational Education, should recommend all qualified candidates to the State Advisory Council for Vocational Education, as well as to the Commissioner for fellowship awards.

If the funds cannot be obtained through the Commissioner's discretionary programs, and a given number of fellowships cannot be committed to the project, funds would have to be sought through several other state programs.

The critical factor will be the provision of stipends. Asian, Hispanic, and Indian applicants could also find support through the Bilingual Vocational Instructor Training Program, an estimated \$625,000 of which has been allocated for the cost of training instructors. Some of the applicants will qualify for Comprehensive Employment and Training Act (CETA) Title VI funding; since they are likely to be unemployed and many will be in the mid-to-lower income level. Others might obtain stipends under the Higher Education Act. If the commitment of the number of fellowships is too small, or too undependable, the cost of the internship described in section III.B can be sought from those LEA's which are experiencing teacher shortages.

4. Coordination of State Department of Vocational Education, and Local Education Agencies with the Teaching Universities

The interest in investigating the feasibility of a retraining program within a state could emerge from within the State Department of Vocational Education or from an educational institution within the state. Once the preliminary planning and research has been conducted and a determination has been made that a retraining program is warranted, all future activities should proceed on a coordinated basis involving a partnership between the State Department and the university. The LEA's should also be closely involved, since it is their need for more vocational education staff that is an essential component of the program. The design of the program must also include the participation of state certification and curriculum specialists working with university personnel. In addition, to assure participants of certification status upon completion of the program, continual communication must be maintained throughout the program. Some State Departments already have established administrative lines between trade and industrial education and industrial arts disciplines. Where these linkages exist, they should prove useful to implementation of a project that would include training teachers in both areas. Where the linkages do not already exist, efforts at coordination will have to be given special consideration. The State Department of Vocational Education should also assume responsibility for packaging the program in order to assure availability of the several sources of funding. The support of teacher associations such as National Education Association (NEA), American Vocational Association (AVA), American Industrial Arts Association (AIAA), and American Federation of Teachers (AFT), also play crucial roles, since it is their members who will be benefitted, and/or will be involved. They can assist in recruitment and help assure a smooth transition when participants are placed.

It was suggested earlier that an advisory committee to the project be appointed with members representing all those agencies whose input and cooperation will strengthen the program. A committee of this nature meeting on a regular basis throughout the project provides a communication mechanism that will keep the various agencies up-to-date with project activities and provide the opportunity for the agencies to inform the project administrators of any changing demands or needs that should be taken into consideration by the university. Whatever form it takes within a state, such a coordinating mechanism is an essential part of a successful program. The agencies and organizations mentioned should be represented on the coordinating committee. If more than one pilot program is funded, coordination among pilot efforts from time to time during the course of the program may also be useful.

5. Evaluation Plan

To realize the greatest benefit from the pilot program(s), clearly defined objectives must be formulated. Once established, these objectives can provide direction to further develop the pilot program(s) and can serve as a measuring rod for their evaluation(s). It is important to define from the outset what is to be accomplished, and to have some means of determining whether or not the program is progressing along the planned course. The proposed evaluation plan would also be useful for programs that are not pilots.

Each component in the program should be described, as well as the characteristics of the women who participated. Data should include cost factors and sources of funds. A record of (a) sources of recruitment, (b) those who were rejected and the reasons, (c) those who were recruited, but decided not to participate, and their reasons for deciding not to participate, (d) their past work experience, (e) the GATB results, ^{1/} (f) the length of time each participant remained in the program, and (g) the success of the school placement should be maintained on each of the applicants in the pilot program(s). At present, it is impossible to determine the personal characteristics of women who are likely to prove successful in this program. It is, therefore, advisable for universities operating pilot programs to do a battery of psychological tests on the women who are accepted in order to determine whether conclusions can be drawn about the women who should be selected for participation.

For women who drop out during the course of the program, an exit interview should be conducted in order to determine their reasons for leaving and in order to determine what aspect of the program might be strengthened in the future to avoid losing participants.

A description of the placements should be included on (a) the number of LEA's involved; (b) the length of time prior to placement that the LEA committed the position; and (c) whether women were placed in the LEA who committed the position. Most important will be information on the success of the women after placement.

If the evaluation of the pilot program proves successful, a dissemination package should be prepared in order to provide information to other states and universities who decide to mount similar programs.

^{1/} See Section III.C.2.

B. Selected Programs -- Trade and Industrial Education and Industrial Arts Education

Of the eight major vocational education classifications, only two--trade and industrial education and industrial arts--meet all of the criteria for a successful retraining program as defined in the model. Health, home economics, and office occupations are female-intensive areas. Distributive education is a "mixed" field, and is only rarely male-intensive at the secondary school level. Agriculture is an expanding occupation only where agribusiness is a major industry in the state. Technical occupations are usually taught at the postsecondary level, and even states with large programs at the secondary level are not likely to require a large enough number of teacher placements to warrant undertaking a program (see Table 3-a, pp.A-11 to 13). Data on cooperative education are not adequate to indicate the number of male-intensive teachers required; however, cooperative teachers in male-intensive and diversified cooperative programs are likely to require teachers since a demand for cooperative teachers has been expressed; therefore, it warrants investigation at the local level. The result is that the two areas that offer the most opportunities for employing teachers in male-intensive vocational programs in most states appear to be trade and industrial education and industrial arts education.

1. Trade and Industrial Education

a. Teachers

Program Design

New teachers and teachers returning to the labor market who have had little or no skill experience and desire to be trained to teach in a trade and industrial education program could do so in a few states, but it would indeed be difficult to fulfill all of the requirements in the two years of time allotted even for those with good aptitudes in manipulative skills. The educational background of elementary and secondary teachers generally consists of a bachelor's or master's degree; additionally, the re-entering teachers will have had several years of teaching experience. It is unlikely that these teachers will have had either work experience in a skilled occupation or vocational training at the secondary or postsecondary level. Therefore, in order for a teacher to become certified in trade and industrial education, she would have to complete one of the following:

- An apprenticeship program (from three to five years), plus two to three years additional work experience at the journeyman or trained employee level for a total of five to eight years. Although supervised work experience situations could shorten the number of years it would take, ^{1/} any trade and industrial education program that requires completion of apprenticeship as proof of competency would be an unlikely area to consider because the time involved will be unduly long to be appropriate for the model program (see Table 3-k, pp. A-33 to 34); or

^{1/} Many states will credit a student with two years of experience for each year of supervised work experience.

- Completion of a secondary or postsecondary vocational training program (generally two years) plus two to four years work experience. Performing supervised industrial work experience concurrently with the classroom experience, 1/ rather than seriatim, could reduce the time, but it would still take two years to obtain the minimum work experience for most states, even under supervised conditions. It is possible that a teacher (in certain states) could complete the skill requirements in the allotted two year period, but it is unlikely that she would be able to complete the required coursework to teach vocational education within the same two year time frame. It is possible that a program could be designed, with the approval of state certification officers, particularly in states that encourage early access to employment for teachers, that would permit participants to begin teaching with a temporary certificate and complete her additional classroom work as part of an in-service training program, or she might be able to eliminate all or most of it by successfully passing the occupational competency tests. 2/
- Completion of a degree program in trade and industrial education. Given the fact that teachers would be given credit for most of their existing credits such a program would take approximately three years and could include both the vocational education coursework and supervised work experience.

Preparing to teach trade and industrial education requires a complex of skills to be learned and requirements to be attained including manipulative skills at an employable level, as well as cognitive, theoretical skills underlying those manipulative skills. On top of acquiring the occupational or manipulative skills, teachers also would need to possess those professional or teaching competencies identified as important to vocational teachers. In consideration of their career background, most teachers would be familiar with basic teaching competencies common to all educators, such as "developing lesson plans," or "present information with chalkboard." Competencies unique to vocational teachers such as "job and task analysis" would have to be acquired in classrooms through pre-service or in-service training.

If a program to retrain teachers as trade and industrial teachers were attempted, women who had acquired some skills through interest or life experience would be the most appropriate candidate. 3/ Preparing a teacher with no previous trade or industrial experience would be a long and difficult task. She could be more easily trained as a teacher of industrial arts. On the other hand, it would not be a difficult task to prepare a woman already experienced in a skilled occupation to qualify as a teacher in a trade and industrial education program (see Skilled Women).

1/ The standard method of calculating one year's work is employment for 2,000 hours.

2/ For an explanation see Section II.

3/ Some rural women, for instance, may have obtained considerable mechanical experience by having lived and worked on a farm.

Work Experience

If a supervised work experience in industry is undertaken as part of the program, it would be the responsibility of the university to obtain the cooperation of industry and to design an appropriate industrial placement.

In identifying industrial work stations, university personnel should:

- Make a survey of business and industries in the area to determine availability of placements;
- Determine those businesses and industries that are willing and able to cooperate in the education of teachers;
- Obtain agreement that close supervision will be available for those placed in training, as well as define an agreement on a training plan to assure that each student will obtain appropriate training;
- The industrial experience should provide time for exposure to the functions of the industry, as well as the requirements of the industry for student placements;
- Arrangements should be made to assure that participants are compensated for work completed for the employer as part of the training placement.

Utilizing an industrial setting will provide specific learning experiences that will prepare the prospective teachers in the shortest time possible. Through successful supervised work experience on site, women will become familiar not only with the essential work skills, but also with the mores of the occupation she will be teaching.

University staff who have the responsibility for identifying the work stations and approving them for academic credit, should visit the work stations to determine the quality of training, and convene the women placed at work stations as a group to discuss their learning experience gained from the work stations. The coordinator's sensitivity in observing the social adjustment exhibited by the students on-the-job will definitely affect the success of the placement. The work station visit by the supervisor should become the vehicle for critical observation and evaluation, and a basis for planning related-instruction to be completed at the university.

Efforts should be made to insure that feedback is given by the work supervisor to university staff and from the staff to the students. Such feedback may be provided through seminars, and class discussions, as well as by evaluations. To make it most useful, the occupational experience must be integrated with the teacher education program to insure that most value is obtained from the placement. Alternating work training and performance of learned task will reinforce the learning acquired through

work experience, as well as that which is learned in the classroom, which suggests that a cooperative work model--half day in a classroom and half day in a work situation--should prove very useful. The emphasis would be to help the women relate their industrial experiences to a teaching situation. Orientation to teaching the skill while still learning the skill should be a major approach. The skills the teacher learns will have added significance, if they are taught in the context of teaching them.

Competency-Based Programs in Trade and Industrial Education

The acquisition of occupational skills and experience will be of primary concern to this group of women. However, since universities or teacher training institutions are not equipped to offer vocational programs, it would, therefore, be necessary to conduct such programs in vocational technical schools, or junior colleges where facilities are available. Competency-based vocational materials developed to teach vocational skills have gained wide usage among vocational educators in secondary and postsecondary vocational schools. For example, the Vocational-Technical Education Consortium of States (V-TECS) has developed catalogues of performance objectives and criterion-referenced measures in the various vocational fields, ranging from auto mechanics to appliance repair, for use by vocational educators in participating states. 1/ The military has also developed competency-based vocational materials, and trade and industrial education occupations are well represented in military curricula. 2/ Competency-based materials by other organizations such as industry are also available and could be used in other male-intensive vocational fields.

Teachers, although familiar with the general aspects of teaching methodologies common to all educators, must also acquire those professional competencies that are unique to vocational educators. A competency-based approach can also be used to assess teaching skills previously acquired by the teachers.

In view of the different needs of the target populations, competency-based programs focusing on the needs of (a) women elementary and secondary teachers, and (b) skilled women, would therefore be extremely useful.

Pre-service Training

During the first year, a teacher could undertake training at a post-secondary school that would enable her to acquire the preliminary skill levels in the relevant trade. Additionally, components of her program would include courses in vocational education at the college level that would provide her with the base for teaching in her subject area. An elementary teacher may also have to take courses to acquire a secondary school certificate. During the second year, the woman would have to undertake work experience in a supervised industrial setting, so that an appropriate level of facility could be achieved. The cycle would be repeated, as necessary, depending on the skills required for her chosen field.

1/ Spellman, Robert E. and Herbert Bruce, Jr., "V-TECS: The Push to Competency-Based Curriculum," American Vocational Journal, September 1976.

2/ Strong, Merle. "Storehouse of Sophisticated Materials at Voc. Ed.'s Door," American Vocational Journal, September 1976.

In-Service Training During the First Year of Teaching

A team teaching model could be established, with the teacher assuming responsibility for the cognitive aspects of the skill training after she has completed a year of training either in postsecondary school, or through work experience; and her team partner, a skilled woman with appropriate work experience (who is also enrolled in the program), teaching the manipulative skills. Two classes could be simultaneously conducted in this manner.

It is assumed that upon program approval, the state could issue a temporary certificate for the teacher and waive the remaining non-teaching work experience requirement. Under any circumstances, a teacher could utilize her secondary school teaching certificate to teach the cognitive skills. With practice, both women would eventually learn all the required tasks at a performance level acceptable to herself, her male peers, and her students. After one or at the most two years, both women, by reinforcing each other's skills could each gain sufficient skills to be employed as permanent teachers in a school system. Supervision and a supportive program for both women should be continued by the university, until each woman has gained enough confidence to teach a full program on her own.

b. Skilled Women

Program Design

Vocational educators have estimated that 90% to 95% of the teachers of trade and industrial education were formerly employed in industry as skilled tradespeople; the certification requirements of most states reflect this fact. It is only in recent years that college degree programs have been designed for the purpose of training trade and industrial education teachers. It should, therefore, be a straightforward procedure for skilled women to move toward certification--skilled men have been doing it for years. If a skilled woman has the required years of experience, is a high school graduate, and meets the other requirements, she would qualify for certification in most states.

Although the number of women who have already gained work experience are few, they are likely to provide the major resource to become women teachers of male-intensive trade and industrial programs. It is likely to be easier and certainly faster to provide these women with the essential teaching skills than it will be to provide women teachers, experienced in teaching traditional subjects, with the manipulative skills required to teach a male-intensive trade and industrial subject. The only problem that may arise would be the transition of women from an industrial environment to an educational environment. Even for those women who have become accustomed to a male-intensive working environment, the transition might prove difficult and require support.

Competency-Based Programs

Competency-based curricula in vocational teacher education are presently being explored by many teacher training programs, and are being implemented, either partially or fully, in several universities such as Florida State University, Temple University, Wayne State University, University of Minnesota, University of Nebraska, and others. Competencies are identified for the acquisition of teaching skills rather than occupational skills. The most widely known vocational education competencies have been developed by the Center for Vocational Education at Ohio State University and were later revised and/or tested at several sites including Oregon State University, University of Missouri, Temple University, Florida State University, Colorado State University, Rutgers University, University of Nebraska, and others. The U.S. Air Force has recognized the lack of teaching skills of its vocational instructors and has designed a concentrated, 6-week (or longer) pre-service course in teaching methods and techniques. 1/ Since trade and industrial education teachers were generally recruited from industry among skilled individuals, who already have the vocational competence and work experience required to be certified, the CBTE programs focus only upon the teaching of professional competencies needed by the vocational teachers instead of occupational or technical competencies. 2/ Thus, these competencies would be appropriate for skilled women in obtaining competency as teachers.

The potential vocational teachers should gain experience in writing periodic reports, doing library research and organizing instructional materials, then become competent in organizing and structuring content into a logical teaching format during the transition from an industrial setting to a teaching situation. Classroom instruction in industrial education methodology will permit the student to select a curriculum consisting of audio-visual media, curriculum building, shop organization and management, and teaching methods. Through such careful direction, these skilled women should be able to make a relatively simple transition from industry to education.

Pre-service Training

In some states, a short pre-service training period is required of newly recruited skilled persons who have had no prior teaching experience. These pre-service courses are usually given during the summer in order to provide teachers with knowledge of the basic teaching methods and techniques which they would need before classes start in the fall. Pre-service courses have increasingly been viewed by teacher educators as an important part of vocational teacher education, and it is clear that a carefully planned competency-based pre-service training period has its place in a retraining program. Florida has identified pre-service competencies that consist of minimum "survival skills" for vocational education teachers. 3/

1/ Campbell, Capt. Dale F. "The Easily Adaptable Instructor Training Course of the USAF," American Vocational Journal, March 1977, p. 24.

2/ Andreyka, Robert E., "A Florida Approach to Competency-Based Vocational Teacher Education," April 1976.

3/ Ibid.

Skilled women should be able to assume actual classroom teaching after having attained these pre-service competencies. Further teaching competencies can be acquired through in-service training. However, to assure that the women are comfortable in their new roles, it is urged that the pilot programs insist on at least a six month pre-service period for the women with work experience and an internship assignment for at least another school term, before taking on the responsibility of a class on her own initiative.

Skilled women who have obtained vocational training at the postsecondary level, could attend college part-time and work part-time in an industrial supervised work experience. Depending upon the requirements, a combination of coursework and part-time work experience could be designed which would produce a B.A. and certification at the end of two years. Design and approval of such a program should be developed so that the participants pursuing this route could be issued a temporary certificate and permitted to complete additional requirements during an in-service training program.

In-Service Training

On completion of one half year of education courses, a trainee could move into an internship position at a comprehensive high school or a vocational high school. The trainee could be placed with a trained vocational teacher in order to learn the teaching skills by observing an experienced teacher. Since the woman already has the skills and the techniques appropriate to the trade and is familiar with the tools, she would be able to move into a useful function in the classroom, assisting students having difficulty with shop. She would gradually have the opportunity to pick up more of the teaching functions, first in the skills, and then assume full responsibility for the class. In concert with the field-based approach of competency-based programs, her performance during the internship should be monitored or evaluated by personnel of the university. The trainee would continue to attend college, after starting to teach, to take the essential professional and theory courses in order to qualify for a permanent certificate; she may want to continue in order to acquire a B.A. in order to improve her income.

An alternative to this program would be an assignment to a team teaching experience as described in the previous section on women teachers.

2. Industrial Arts

Historically, there have been different attitudes and opinions regarding the role of industrial arts and its relation to vocational education. Clearly, it is now viewed as legitimate for funding under a vocational education program, and federal funds to support such programs are allowed under the new regulations.

Industrial arts education programs which may be funded are those industrial arts programs which:

(a) Pertain to the body of related subject matter, or related courses, organized for the development of understanding about all aspects of industry and technology, including learning experiences involving activities such as experimenting, designating, constructing, evaluating, and using tools, machines, materials, and processes; and

(b) Assist individuals in making informed and meaningful occupational choices or which prepare them for entry into advanced trade and industrial or technical education programs. 1/

States, however, have taken different approaches to industrial arts, with some using vocational education funds to support these programs; other states do not.

Although work experience is not required in most states to teach industrial arts, a bachelor's degree in industrial arts is required. In order to obtain a degree and be certified to teach industrial arts, a student must satisfy all college or university degree requirements including a prescribed number of hours in general education and in the teaching of industrial arts. Technical courses included in training for industrial arts often cover the following five areas: materials (including metals, wood, plastics, etc.), graphic arts, electricity/electronics, power and transportation, and drafting. 2/ Additionally, courses such as career orientation or career education are also included. Professional education courses usually include three or four courses in the methodology of teaching industrial arts.

In many states, in order to teach industrial arts at the secondary school level, an elementary school teacher must qualify for a secondary school certificate.

a. Teachers

Program Design

All elementary and secondary teachers possess at least a bachelor's degree. The additional semester hours required for a secondary school teacher to obtain a degree in industrial arts including courses to obtain manipulative skills and professional education courses will generally range from 36 to 48 semester hours. Given these two facts, a retraining program providing the training required to meet industrial arts certification requirements could be easily completed within two years.

The bulk of the program would consist of the acquisition of occupational skills where hands-on knowledge and experience would be acquired. In addition, the students would require industrial arts teaching methodology

1/ §104.592, Federal Register, April 7, 1977 (Proposed Rules)

2/ See, for instance, undergraduate catalogues for University of Wisconsin-Stout; State University of New York--Oswego.

courses. However, if a competency-based program were implemented for the courses on teaching methodology, or if competency tests were offered permitting teachers to exhibit teaching skills, teachers could probably shorten the time invested by passing such competency-based examinations. For instance, at Wayne State University, there are presently five or six industrial arts education students who were originally trained to teach other areas. To meet their program requirements, students are taking approximately 54 quarter hours of laboratory or workshop courses. Assuming a full load of 15 hours per quarter, they can fulfill the technical requirements in three terms plus a summer session. They would also have to take two methodology courses, which could be competency-based. Therefore, if one of the students feels that s/he is competent in, for example, the competency of developing a lesson plan, s/he could request an evaluation of competency in this area; if the performance is deemed satisfactory, s/he would have satisfied this particular requirement, and could proceed at his/her own pace to another pre-identified competency. 1/

Elementary teachers, in addition to the laboratory or workshop skills and the methodology courses, may also be required to take courses in order to meet certification requirements to teach at the secondary level. It is projected that a teacher holding all qualifications for a secondary certificate would be able to obtain a certification in industrial arts, as well as the necessary skills in no more than two calendar years, and that many will be able to complete the program in less time, especially if she accepts an internship, and successfully completes the program.

Pre-Service Training

Manipulative skills can be gained either in college laboratories and/or at postsecondary vocational institutions, where the particular skills which she will teach can be learned. Teaching methodology would be available at the university. She would continue her classes until she has completed the courses necessary for certification as an industrial arts teacher.

For the second year, she could obtain an internship and be assigned to an experienced teacher in a beginning industrial arts program to develop her specific skills in a work situation. She would be able to compare her skills with the level of skills of the students, so she will know the level she must obtain to be competent and confident in the classroom. She would gain familiarity with the shop class, and the problems facing the shop teacher. She would be able to assist the teacher first by helping the students who are least adept, and gradually developing sufficient skills to be able to help the more adept students in the class. Again, similar to the design of internship for the participant in trade and industrial education, her internship performance should be monitored and evaluated by university staff.

1/ Information per Prof. John Bies of Wayne State University, Department of Vocational Education, January 1977.

b. Skilled Women

Program Design

For skilled women who have not attended college, a program in industrial arts would require obtaining a trade and industrial certificate and then moving to teach in the area of her expertise at the pre-vocational level. The program would, therefore, be similar to that of skilled women in trade and industrial education; since her skills would be in a particular area, it would limit her usefulness and she might be required to acquire skills in other areas.

Some universities will give up to two years of college credit for successful performance on proficiency examinations. In those universities, it is possible for skilled women to pursue a bachelor's degree in industrial arts within the two year time frame, if they perform successfully on the examinations and obtain the two years credit. In some cases, universities may also grant credits for work experience gained in a field related to a student's area of concentration.

A woman who has obtained an associate degree from a postsecondary school in a male-intensive vocational program would be able to qualify as an industrial arts teacher within the time limit, if the university credited her with all courses taken at the postsecondary level and if she broadened her base in skills as required for certification.

Pre-Service Training

For women who attended a postsecondary school or received two years of credit by competency examination, pre-service training would involve at least two years of in-depth concentration on the acquisition of teaching skills, and additional courses to obtain her degree. This would include education theory and broadening her knowledge to related skills either in shop courses at the university or in postsecondary schools. The trainee would continue to attend college until she had the essential education and theory courses to qualify for temporary certification, or for a BA degree.

c. Teachers and Skilled Women

Competency-Based Curricula

To date, fully implemented competency-based industrial arts teachers education programs are less widely applied than those in trade and industrial education. Difficulties exist due to the fact that competencies have to be acquired in manipulative skills as well as teaching skills, very little of which have been developed as part of the curricula for teacher training, although competency-based curricula for students have been developed in the industrial arts subjects and are utilized in junior and senior high schools. The trade and industrial subjects taught at the postsecondary level that would provide the base for teaching industrial arts pre-vocational skills, do use competency-based curricula.

Competency-based curricula for teaching skills have been developed for trade and industrial teachers, but have not been fully developed for industrial arts teachers. There seems, however, to be widespread interest on the part of industrial arts teacher educators in developing and implementing competency-based teacher education programs. 1/ Partial implementation has taken place in several universities including Florida International University, Ohio State University, University of Georgia, and others. Competencies are presently being developed at Pennsylvania State University based on those competencies identified for general education teachers, as well as those based on the manipulative competencies required of students.

Acquisition of Skills

There is no requirement, except in a few states, for work experience for industrial arts certification, but skills can be obtained through:

- On-campus laboratories;
- Off-campus postsecondary vocational schools;
- Industrial experience.

The concept of learning-by-doing can be implemented through small laboratory classes utilizing student training teams. Part of the instruction time can be set aside for discussing and demonstrating techniques. Student activities could include lecture-demonstrations, experimentation under supervised laboratory conditions, discussion sessions with industrial representatives, and observation. Manufacturers of teaching aids and systems could be invited to supply literature and information on new products, which could be used in the classroom.

Classroom experiences can be expanded by working and/or observing in industry for short periods of time in industrial placements which represent the categories in which employment of high school students is most prevalent. Different companies can be involved so that the student can study the operations and procedures of industry.

It is important that the observation method be well integrated with the hands-on approach learned in the classroom.

As part of the pre-service program, the student might spend several weeks in a field experience in the type of school where she is likely to be teaching which will provide another type of reality-based experience to strengthen classroom experience.

1/ Brueck, Jack and Stanley E. Brooks (eds.). Competency-Based Industrial Arts Teacher Education, 26th Year Book of the American Council on Industrial Arts Teacher Education, (1977), Bloomington, Illinois: McKnight, 1977.

C. Techniques and Programs Responding to Special Needs

It is crucial to the concept of retraining that the initial group of women moving into positions which have been traditionally held by men be well trained and competent to assume their new positions. If, on completion of the preliminary training, women who are less than qualified are placed in classrooms, and their performance is less than acceptable, they are likely to hear, "I told you that women couldn't do this job." If the first group of women placed succeed in doing a competent job, it will be far easier to expand the number of women entering these male-intensive vocational teaching positions. To insure that this positive experience occurs, supportive programs will be required that respond to the unique circumstances being proposed.

If the women who enter the program are to make a positive adjustment to the male-intensive atmosphere into which they will be moving, assistance must be offered not only to the women participants, but to the faculty at the university undertaking the pilot program as well.

The supportive programs can appropriately be designed to serve women who have a variety of occupational and educational experiences: women who have never attended college, women who have completed their associate degrees, recent teacher graduates, teachers with graduate credits or degrees, and teachers who are seeking to return to employment in schools. This section describes the various supportive programs that will be required.

1. Changing Recruitment Practices

Recruitment of participants into this program would be substantially different from traditional recruitment methods usually practiced by universities. What sets this apart from the general routine lies mainly in the special characteristics of the women to be recruited for the program, thus affecting (a) the sources of locating prospective participants, and (b) the procedures of recruiting.

Locating Women

Considerable ingenuity will be required to identify and recruit women possessing the requisite skills. The recruitment of elementary and secondary school teachers should be a relatively simple undertaking. On the other hand, the recruitment of women who are working in skilled jobs may be difficult, because there are so few women with the necessary experience. Recruiting through industry is not likely to be very profitable; in light of the pressure on industries to hire women and minorities, industry is not likely to participate in an effort that will result in their losing skilled women. Another factor making the recruitment of skilled women difficult is that teaching salaries are not as high as industry's. On the other hand, work and vacation schedules of teachers is attractive to women, particularly to working mothers.

Professional and Trade Associations

Many professional and trade associations provide either formal or informal placement and referral services for their members. Often the associations keep updated rosters of their members' employment or unemployment status and

publish newsletters or journals in which the project could place an advertisement describing the program and providing information regarding entry into the program. Many of the associations have committees which focus on women's issues and are interested in improving the status of women. One can expect that these groups would be very cooperative in helping to locate interested women. In most cases, local affiliates of national organizations, due to their closer relationships with their members, will be more useful than the headquarters, and therefore, if their local affiliates are known, they should be approached first. National headquarters will provide university with points of contact of the closest local affiliate.

Some talent banks include unemployed teachers. The national women's unions can provide referrals to a growing number of organizations developing at the local level, who will have lists of skilled women by specific occupations. Local church groups, women's groups, and International Sororities may also be possible places for locating prospective participants.

The organizations listed in Appendix B (pp. A-44) represent several possible resources. It is not intended to be all inclusive. Rather, it is representative of the types of organizations which may help a university to identify and recruit women. Persons listed were correct at time of publication, however, turnover of persons in these positions occur frequently.

The following items describe recruitment methods that can be used to locate teachers or skilled women interested in the program:

Recruiting Elementary and Secondary School Teachers

- All teaching institutions in the state that are training teachers should be contacted through their departments of elementary and secondary education and the college placement offices. These sources will be able to identify recent graduates who have not been placed, as well as re-entering teachers who are seeking employment and have sought the assistance of their college's placement office;
- The personnel offices in local school districts can identify new teachers and re-entrants who have applied for teaching positions but have not been placed;
- Local public and private employment offices that service professional women should be provided with a description of the program and the type of candidate sought;
- State and local educational associations, and federations of teachers should be contacted for lists of members not presently employed, and to place announcements in their newsletters or bulletins;
- Newspapers, radio and television can be provided with information about the program and can be requested as a public service to encourage interested women to contact the program.

Recruiting Working Women with Experience

- Teachers and administrators in secondary and postsecondary vocational education programs should be contacted as a means of identifying women who have completed their courses. The emphasis should be on identifying both women who graduated long enough ago that they would have been able to gather enough experience to meet certification, as well as the names of recent graduates;
- Articles should be placed in newspapers, both in the public and union, and trade associations press;
- Women engaged in appropriate positions in government or in the military should be included by contacting local Civil Service Offices and local military discharge offices;
- In all cases, women who are recruited should be utilized as a resource for identifying other interested women.

Recruitment Procedures

Once the names of possible candidates are obtained, a letter should be sent describing the program and the qualifications of the women being sought, inviting them to participate in the program. A stamped addressed return envelope should be included for use by individuals who are interested in participating in the program. The project should also follow-up by a second letter and by a telephone call, if necessary, in order to assure that all likely candidates are encouraged to participate.

Women who indicate interest should be invited to a meeting. Because the issues and problems for each group of women are likely to be different, a separate meeting for working women and teachers should probably be planned. A briefing of the two groups at the same time may confuse those who are considering participation.

At the meeting the program should be explained in detail. This would include a description of the support available through the pilot program, the length of time likely to be required, the courses and/or work experience required, and the availability of jobs and stipends. A question and answer period would give individuals the opportunity to ask any further questions and provide the program sponsors with a sense of the concerns, needs and problems to be anticipated. At the end of the meeting, the names of those interested should be collected, and a system for follow-up outlined.

2. Selection of Applicants for Pilot Program

If elementary and secondary school teachers are to prepare themselves to become trade and industrial teachers or industrial arts teachers, significant effort must be made to assure that teachers who decide to undertake preparation for teaching these courses have the basic aptitudes necessary for these occupations. A widely accepted method of determining such aptitudes is the General Aptitude Test Battery (GATB) which is available for guidance and counseling through all State Employment Services and most State Employment Offices.

Since the GATB is readily available and is no more sex biased than any aptitude test, we recommend that all teachers who have indicated an interest in participating in the retraining program should take the test for two purposes: first, to determine whether the teacher has the minimum degree of manipulative dexterity likely to be able to acquire the essential skills necessary to become a successful vocational education teacher; second, in order to develop the basic data necessary to determine the degree of numerical ability, spatial ability, motor coordination, finger dexterity, and manual dexterity required to successfully make the transition to become a trade and industrial and an industrial arts teacher. ^{1/}

If a sponsor decides to utilize this approach, each participant would be required to take the GATB when applying for the program. Depending on the teaching area to be pursued, a minimum performance level would be determined.

Table 3-j (pp. A-33 and 34) shows the expected profile on the GATB for the male-intensive occupations in each of the vocational education courses that are in demand; this provides a benchmark for establishing the minimum required aptitudes for each of the occupations. Profiles are also included for elementary school, secondary school, and vocational education teachers.

How to Utilize GATB Profiles for Selection

Figures 3-k, l, m, and n (pp. A-35 to 38) indicate the main and additional ranges in the four broad male-intensive vocational classifications: Craftsmen, Machine Workers, Precision Workers, and Manipulators (the specific job classifications are listed at the bottom of each table). Since several jobs are covered under each group, the main range of aptitudes indicates that most job classifications covered in the group fall within that range. The additional range indicates that some of the job classifications vary from the majority and require additional (or less) aptitudes. These additional aptitudes are indicated in the Figures by the symbol for additional range.

A teacher preparing students to be employed in a specific occupation should herself have the same level of aptitudes in each of the nine skill areas as are indicated to be necessary by the GATB test: intelligence, verbal ability, numerical ability, spatial ability, form perception, manual dexterity, finger dexterity, motor coordination, and clerical perception. If the teacher is seriously deficient in one or more of the skill areas, it is questionable whether that teacher is a good candidate to pursue a teaching position in that occupational area.

Additionally, there are three similar figures for elementary, secondary, and vocational teachers (Figures 3-o, p, and q, pp. A-39 to 44). These profiles may be presumed to be the expected profile of the potential elementary and secondary school teachers. The profile of the vocational school teachers is the level that the applicant should possess to become a successful candidate for retraining as a vocational education teacher.

^{1/} Collection and analysis of the data which would be included in the evaluation would prove very useful to other universities considering operating such a program.

Table 3-s (p. A-42) is a summary table containing the data for all seven skill classifications. Table 3-t (p.A-43) summarizes the aptitude level of elementary and secondary, and vocational teachers as it compares to each of the skill classifications. The only example where the main range of skill aptitudes is higher is in the spatial ability of craftsmen and vocational educators, which is expected to be higher than for elementary and secondary school teachers. All other examples of higher skills are in the additional range on finger dexterity, motor coordination, form perception and spatial ability. However, clerical perception, form perception and spatial ability expects a higher range for vocational teachers than for either elementary or secondary school teachers.

While GATB is useful in determining aptitudes, no appropriate aptitude test exists for industrial arts teachers. Therefore, it is particularly important that participants entering a pilot program to train as industrial arts teachers be tested, and that a follow-up on the success of the participants be included as part of the evaluation.

Since women from industry already have shown that they possess the necessary skills, there would be no requirement to test them for selection. However, as part of the evaluation of the program, such data should prove very useful.

The personal characteristics of the women who are successful in the program should also be examined as part of the evaluation of the pilot programs, which could then be utilized to provide guidance to others undertaking the program.

3. Counseling and Support Program

The Model and the Handbook have highlighted the unique aspects of this program and the resulting need for a variety of support systems to assist the women participants, the faculty, and school and industry supervisors. This section will describe the way existing services can be utilized, and additional services developed, to meet this need.

Examination of a wide variety of exemplary programs indicates that very little is offered that will prove useful as guidance to university staff developing the supportive programs for the women participating in this program. The major emphasis in most of these programs is the development of models to assist women to broaden their choice of occupation. The women participants of this program, having elected to enter, will already have made their choice, and this choice will only be an outgrowth of decisions that they had made previously--to become teachers, or become employed in non-traditional non-professional occupations. Since many women find it difficult to participate in educational or training programs because of lack of funds, many of the exemplary programs for women devote considerable effort to assisting women obtain funds or loans to defray their expenses. It is assumed that the university, with the cooperation of the State Department of Vocational Education, will have already solved the problem of financial support through stipends.

The women who are likely to participate may vary from women who are most traditional in their attitudes and socialization--elementary school teachers--to those whose decisions have been most non-traditional--those who have selected employment and/or training in "masculine" imaged male-intensive occupations. Many of the programs designed for women make the easy assumption that women are seeking self-realization, and let the assumption dictate many of the approaches--assertiveness training, and counseling for upward mobility. No easy assumptions will fit the variety of women that are likely to participate in this program.

If university staff or school supervisors need an exposure to the issues of sex stereotype and sex bias, curriculum and audio-visual material such as those prepared by the New Pioneer's Project of North Carolina will provide the most useful material available to meet these goals. However, additional materials specific to the issues to be faced by staff and other persons responsible for working with these women will be essential to prepare them appropriately to provide guidance to all of the women in this program. (See Seminars described below.)

a. Women's Centers

Many universities have begun to open women's centers designed to assist women to adjust to college, and to prepare for occupations previously dominated by men. If there is a women's center at the university, it should be investigated in order to evaluate its program, to determine whether its services are appropriate for the women in the program, and whether the women in the retraining program are among the population the women's center is interested in serving. Since many of their activities are oriented to problems of women entering competitive positions with men working in professional, rather than vocational fields, some adaptation may be required if the pilot programs are to utilize the women's centers to provide supportive services. The problems that women in the retraining program are likely to face may be as much involved with gaining the respect and confidence of their students (who are likely to be predominantly young men during the first few years) as it will be in relating to their male peers and administrators. Because the problems of these women are of a substantially different character than those faced by other women at the university, it is essential that personnel within the women's centers be acquainted with all ramifications of the program if the centers are to be utilized. An alternative solution that could be investigated is the continuing education divisions that would be familiar with women re-entrants, and would possibly be more receptive towards the idea of setting up special services for women in this program.

b. Counseling Services

Whether through the women's centers, the continuing education divisions, or through establishing independent group counseling support, counseling services should be available to women in the program. The project should develop counseling programs that will assist the skilled women in the transition from industry to an educational environment; and women teachers from female-intensive to male-intensive classrooms.

Using a woman experienced in group work as the leader, 1/ peer group counseling sessions will permit women to share their problems, and help each other to find mutual solutions. They can also assist women to learn to assess themselves more realistically in an atmosphere supportive of self-exploration. The counseling sessions should help to resolve conflict due to the attitudes of the women themselves and those with whom they will be working. Lacking role models, it will be important for the women to be convinced that they will be able to perform their jobs in a convincing manner. To convince them, the program must be ready to demonstrate that these jobs are indeed available and appropriate for women.

There will be differences in the perceptions and attitudes of the women participating in the program. For those women who have been teaching in traditional subjects at the elementary and secondary level, there is the difficulty of shifting from an occupation where her colleagues were predominantly female to one where both her colleagues and students are likely to be male. The skilled women, on the other hand, must acquire the confidence that they can transmit the skills they possessed in an industrial setting to a classroom setting.

As part of the group process, husbands and men friends of the participants might be invited to informal meetings in groups of men (where supportive men may help to convince those who aren't) as well as in mixed groups including the women participants. Discussion should include their attitudes toward their wives' or friends' participation in the program. The mixed group sessions could explore problems or conflicts both groups feel between their home or personal lives and the program, and their perception of the role of men and women. Such mixed group sessions should be very useful in reducing conflict situations that may arise for some of the women.

Skilled women are likely to have more difficulty adjusting to the educational atmosphere, and elementary and secondary school teachers are most likely to have difficulty adjusting to the male environment, nonetheless, the similarity of the problems are such that the two groups of women should be helpful to each other, since each group would be able to help the other in reducing anxiety in entering a new environment. Skilled women can contribute by relating their experiences in a male-intensive industrial atmosphere, and teachers can contribute their experiences in the school environment. Both groups are likely to have similar problems in gaining the respect of their students, who are likely to test all women teachers to determine if they are the equal of their men teachers.

Being among the first to cross the sex barrier will take courage. The women must be prepared to cope with an all-male work situation, where evolved customs, language and habits have been predicated on a single sex grouping, and they must be equipped to handle the individual reactions of the men whose group they have "invaded". Before entering (or re-entering) the edu-

1/ Staff should consult a group work specialist in the School of Social Work, or in the School of Education if their guidance and counseling department have group counselors.

cation system, the women must themselves feel that they can be successful in their new role. Many women are likely to feel fear at the outset that their experience will not be a positive one. But it will be possible to obliterate that fear once they have some positive experiences, and are able to share their mutual reluctances. They must be able to help each other gain confidence that their performance will be acceptable by male standards.

Women planning to become teachers of industrial arts are likely to have fewer problems with students than teachers of trade and industrial courses since industrial arts students will be younger, and, therefore, more pliable and less able or willing to challenge a teacher. Also, teachers of industrial arts are more likely to be able to find placements across the broad geographic and socio-economic spectrum, equally distributed in central cities and in rural or suburban areas. An industrial arts teacher, therefore, is more likely to find a job in a school similar to the one in which she acquired her previous teaching experience. Many opportunities in trade and industrial education may be in an atmosphere alien to many of the women.

4. Childcare Services

The need for childcare services has been recognized as a critical factor by federal agencies. While not required by any existing legislation, they are recommended by the Department of Health, Education, and Welfare's Higher Education Guidelines. 1/ The Office of Federal Contract Compliance (OFCC) regulations similarly urge their development because their absence often has a direct effect on women's professional activities. 2/ The American Association of University Women is similarly on record supporting the establishment of day care centers by educational institutions. 3/

Before investing a great deal of effort in the development of day care resources, women entering the program should be consulted to determine whether they need childcare, and if they do, if they prefer child care near their homes or near the university. If they prefer childcare at the university, the project should invest the time to locate and make childcare accessible. For such women expressing the need for such services near the university, facilities available on or near campus should be utilized. Due to the relatively small size of the program, it would be unlikely that the project would develop its own day care program. Childcare services are very often provided to university personnel and students by various departments of universities such as the women's centers, home economics departments, early childhood education departments, child development departments, and student organizations. The project should, therefore, investigate the services available that could be utilized.

1/ U.S. Department of Health, Education, and Welfare. Higher Education Guidelines, Washington, D.C.: Department of Health, Education and Welfare, 1972.

2/ U.S. Office of Federal Contract Compliance Guidance. 41 CFR 60-2.24.

3/ American Association of University Women. "Guidelines for Affirmation Action Plans," Chronicles of Higher Education, September 27, 1971.

5. Transportation

Transportation to and from class may pose problems for some of the women. Most women will own cars, but, if married, it is likely that in households owning only one car the husbands will be using it to go to work. In order to facilitate the women attending classes, the university should consider assisting in providing alternative means of travel such as: arrangements of car pools, holding classes in relatively convenient or accessible locations, and/or scheduling classes in the evenings or on weekends, when the women are more likely to have a car available. As long as the problem does not negatively affect the outcome of the program, the university should be flexible in taking the women's transportation needs into consideration.

6. Training Seminars for Project Team

Staff working with retraining participants in pilot programs are themselves likely to be in need of retraining in order to become more sensitive to the implications and extent of sexism in universities, schools and society. Programs of teacher preparation have not in the past dealt with these issues and are, therefore, likely to perpetuate the status quo both in public schools and in universities. Since teachers at every level tend to teach as they were taught, they tend to continue the sex stereotype attitudes they observed and acquired in their own classrooms as students. While in-service training programs have been instituted for public school staff, little organized effort has been undertaken to address the attitudes of teacher educators and faculty at the universities. Short term seminars should be offered to university personnel, as well as school and industrial supervisors prior to their working with the women in the program. Material discussed in the Counseling section should be included in the seminar. Pilot programs should include the development of materials unique to this Model for dissemination to other universities who plan to run similar programs. Programs other than pilots should consult BOAE to determine if such materials have, in fact, been developed.

a. Seminars for University Personnel

Seminars should be held for the faculty at the universities who will be working with the women to assure that they understand the problems they will be facing, and to avoid any negative repercussions at the university and after placement. It is particularly essential that staff of the university who will be relating to the women are appropriately prepared to provide the kind of support that will be needed to assure a successful experience both for the women and the university.

Seminars for university personnel should be held prior to the start of the program, and continue at irregular intervals throughout the first year--more frequently at the beginning, less frequently later; with perhaps five sessions during the first year. The university staff will not only have to understand the dynamics of the women's problems in adjustment, but also to understand the likely attitudes of the men teachers and the students in their classes and the dynamics of the interrelationships.

These in-service seminars must be of sufficient length to stimulate the necessary insights and to motivate the faculty sufficiently or it is unlikely that they will change teaching methods or their understanding. If they are to have a successful experience, they must come to understand the rationale behind the development of such a program, as well as their prospective women students. The seminars should be designed to transmit information to the faculty about the women participants and their problems and then leave it to the group to find their own solutions. The problems that these adult women are likely to encounter may vary, but understanding their difficulties will help the staff of the teaching institutions to gear their attitudes and responses to the variety of needs of the participants. The problems and stereotypes that are likely to be anticipated are described below.

The women teacher participants are likely to have been exposed to only their mother, their school teachers, and nurses--all women in traditionally feminine occupations. They may have had no opportunity to know about, much less observe, women in non-traditional occupations. Many of these women teachers were quite comfortable in their acceptance of a traditional female job--that of an elementary or secondary school teacher. In early childhood they learned which activities and interests were appropriate for individuals of their sex. Their own socialization may have made them as traditional in their outlook as any members of the faculty.

On the other hand, skilled women have elected to enter a non-traditional occupation and have successfully adjusted to male-intensive training and/or employment. Almost certainly they selected this occupation with little or no assistance in their decision-making, and although some received support for their decisions from family and educational personnel, many have faced the direct or indirect results of sex stereotype and sex bias. 1/

Various studies have shown that certain personality traits and behaviors have been identified as "appropriate for women" or "appropriate for men." Cultural expectations require that a woman be taught to be feminine--which is usually interpreted to mean submissive, dependent, docile. She is conditioned not to be assertive and competitive and to consider herself intellectually inferior to men. Those traits which are most often taught to girls as valuable for women are: tact, neatness, sensitivity, supportiveness, gentleness, calmness, orderliness, efficiency, and avoidance

1/ Rj Associates, Inc. A Study of the Factors Influencing the Participation of Women in Non-traditional Occupations in Postsecondary Area Vocational Training Schools, Volume I, Arlington, VA: November 1976.

of harsh language. Those characteristics which are most often identified as valuable traits for men are: self confidence, aggressiveness, independence, ambition, competitiveness, objectivity, logic, decisiveness, and dominance. Generally speaking, the "masculine traits" are viewed as more useful in contributing to successful careers than the "feminine traits". For a woman to defy these expectations obviously requires an especially strong personality. It is likely that women who have been employed in male-intensive occupations may have such strengths; this could also be true of graduates of non-traditional postsecondary male-intensive vocational programs; but it is not likely to be true of the teachers, particularly the elementary school teachers, since they have not necessarily taken on the characteristics of non-traditional women by simply having enrolled in this program. Women who demonstrate the valued male traits in their work have often been labeled as "aggressive females," scarcely a complimentary term. It is likely that some of the women who have worked in male environments may have acquired these traits in order to survive. Some of the women students are likely not to be aware of the cultural stigma attached to their sex, for this reason, faculty should also be prepared to transmit their newly obtained cultural awareness to these women. The staff of the program must be prepared for the expected differences among the women, and be able to respond to both groups as being appropriate.

In order to be effective, the faculty's effort with women should not be passive; the faculty should not wait for the women to ask for help. The women may not necessarily know that they need help and may remain unaware of the problems they are facing, until it will be too late, and they they might decide to drop out of the program.

Some women are likely to feel that their skills and abilities are inadequate or that they may have difficulty gaining the specific skills or abilities that they are likely to need, because they often lack self-confidence. Those women who have been away from formal education for a long period are likely to experience the same problems experienced by all adult women returning to education. They may find their memory of mathematics inadequate; they may find it difficult to re-establish good study habits. Faculty should anticipate that lack of time is likely to be a major problem for women, much more than for men. For women returning to the labor force, family obligations are likely to constitute significant obstacles. While still in the program, if they have children, they may have difficulty finding and affording childcare unless such services are offered by the program. The women may also have difficulty due to lack of support from their families in their decision to undertake the program.

To counteract the insecurities, it is important that women have a positive experience from the beginning in the program. Once a woman has had a negative experience with one instructor, she is much more likely to be sensitive or to expect similar treatment from another instructor. It will be the responsibility of the staff to make every effort that the women have positive experiences.

b. Seminar for Supervisors in School and in Industry Where Women are Placed

To assure that women's experiences are not colored by sex bias, seminars should also be made available to teachers of male-intensive programs

in the secondary schools where women are placed, and to supervisors in industry. The responsibility for instituting such seminars should rest with the university to assure that the women succeed both at the university and in their placements. Every effort must be made to assure that discriminatory behavior will not be experienced by the women who participate in the program. The content and approach of these seminars should also include the issues on the characteristics of women previously discussed.

Since the persons with whom women will have to work are likely to be male vocational teachers or male supervisors who have developed their habits and attitudes, they are likely to have been subject to a life-time of sex socialization. All who come in contact with these women are likely to have been preconditioned to consider them "different"; many of the stereotypes will be influenced by sex bias. The teachers and supervisors may already be practicing some sex role stereotyping in their classrooms and their work sites in their treatment of students and employees and in their assignments of tasks. The participant cannot be assigned to a school or industrial placement and then be forgotten; it will be the responsibility of the university staff to follow-up on all placements.

In order to improve the likelihood of the success of the project, these teachers and supervisors must be assisted to understand their own motivations and reactions both to the women teachers who join their school staff or their workplace, and as a side effect to the women students who enter their classes or in industry to other women employees. The overall work climate will greatly influence the performance of the women teachers. Considerable effort should be exerted to provide the kind of climate most conducive to the productivity of these new women teachers.

It can only be expected that the men vocational teachers and supervisors are likely to view the integration of women into their classrooms and work-sites as an unnecessary invasion. Some will have difficulty viewing women as fellow workers and equals. Others will resent the situation simply because it is new. To ignore this backlash, to assume that problems will gradually fade away, is unwise. The administration of the school and the employers must make it clear that it is policy that women be treated as full and equal participants.

If the seminars take place prior to placing the participants, the men teachers will not be surprised by a new female co-worker. Men teachers and supervisors should be given an opportunity to voice their concerns and offer suggestions as to how problems should be handled, if they arise. The university should try to place the first women in male-intensive occupations in schools or internships with those teachers or supervisors most likely to accept them. This will eventually be less crucial, if more and more women are so trained, and the men teachers and supervisors adjust to the idea of having women teaching male-intensive vocational education courses. The first few placements, however, are likely to set the trend for subsequent placements, and it is important that they be successful. Most critical will be the need to assure that newly placed women employees and the men with whom they will be working are able to work out their differences and solve their day-to-day problems as soon as they arise. Even with the greatest effort and planning, some men are still going to be at a loss when it comes to interacting on a day-to-day basis with the women teachers.

Communication may not flow as openly and freely to the women teachers in male-intensive occupations as it does to their male colleagues, and yet women, particularly those that are new to these positions are likely to need more information than do their men co-workers, because they may not be as familiar with what is expected of them. Clearly the women are more likely to perform at their best if there is a clear understanding of what will be expected of them. Clearly these new teachers will have to know how they are doing, where they are reaching expected standards, and where they need to improve. They should not be permitted to flounder on their own, and wonder how their performance is being viewed by the men--many important decisions in a school system, as elsewhere, are established outside of formal meetings and decision-making structures. Communications must assure that the women are likely to be included. If their role is to be completely understood, the system must understand the difficulty during the early period until the women adjust, and it should be the responsibility of the program staff to facilitate the resolution of any problems.

Once placed, women teachers are more likely to assume the responsibility of encouraging young women to participate in male-intensive vocational education programs, and this should be an expected outcome of this program. Male teachers should understand this issue before being faced with it, and should be ready to encourage the women teachers' activities. There could be marked friction if the men teachers are not willing to accept young women students in their classrooms, or if they treat them in a manner which the women teachers will consider to be discriminatory. However, the women teachers should be made aware from the outset of the fact that their legitimate activities can also lead to problems. If they invest time in encouraging the women in their classes, they must also spend time with the young men. Otherwise, their activities are likely to be resented, both by the young men in their classes and by the male vocational teachers. However, to make this type of program produce maximum impact, the women should be encouraged to meet with junior high school girls and other groups in order to encourage other young women to enter non-traditional vocational training. The male vocational teachers should be helped to understand the useful role the women can play in eliminating sex stereotyping in the vocational education system.

7. Placement System

The sponsor should be prepared to provide a variety of placement services. As part of the program planning and development, the university should assume the responsibility for contacting LEAs prior to the start of the program to identify specific placement opportunities. Since women who qualify for certification would be quickly employable on completion of their pre-service training, the project should be able to identify schools in need of teachers in the appropriate disciplines. Additionally, if internships are to be arranged, the university should assume the responsibility for developing and supervising them. The university should negotiate with schools for the commitment of permanent placements on completion of successful internships.

Skilled women particularly are likely to need assistance in preparing for the job interview and understanding the problems they are likely to face in the classroom, since there may be some prejudice in hiring a woman for a job that has been generally filled by men. Assisting the women to be prepared for the interview is only one approach. The university staff may also work with the school system apprising them of the expected advantages to their women students of employing such a role model, and at the same time helping the male students to see that women are also capable of working under so-called "masculine" conditions. If a school is willing to place program participants, the university can then offer to provide a seminar for its faculty members, helping them to understand the role of the new teacher.

Conclusion

Women teachers in secondary male-intensive vocational education programs can open more doors for women considering entering non-traditional careers, since role models to which they can relate will be more readily available. If the program is successful, as male peers and students of the women become accustomed to the idea that women, too, are capable of teaching male-intensive vocational courses, they may gradually become accustomed to accepting women students in their vocational education classes.

In conclusion, this Handbook has described crucial issues tangential to the planning and implementation of a Model to retrain women teachers and skilled women to become teachers in male-intensive vocational programs. By implementing a program such as the one described, a State will not only be advancing another step towards eradicating sex bias and sex stereotyping in vocational education, but will at the same time address the problems of its women teachers.

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APPENDIX A

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APPENDIX B

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Table 1-a. -- Supply of Teachers, by State --1974

State	Agriculture	Trade and Industry	Industrial Arts
Alabama	U	U	U
Alaska	-	-	-
Arizona	-	-	-
Arkansas	U	U	(B-)
California	U	U	U
Colorado	U	(B-)	U
Connecticut	U	B	B
Delaware	-	-	-
District of Columbia	-	U	U
Florida	U	U	U
Georgia	O	U	B
Hawaii	-	-	-
Idaho	B	U	U
Illinois	U	U	U
Indiana	B	U	U
Iowa	U	U	U
Kansas	B	U	U
Kentucky	B	U	U
Louisiana	O	U	U
Maine	-	U	U
Maryland	B	U	U
Massachusetts	U	U	U
Michigan	B	U	U
Minnesota	U	U	U
Mississippi	B	(B-)	B
Missouri	(B-)	U	U
Montana	B	U	U
Nebraska	B	U	U
Nevada	-	-	-
New Hampshire	-	-	-
New Jersey	B	U	(B-)
New Mexico	U	(B-)	B
New York	U	(B-)	U
North Carolina	O	U	U
North Dakota	(B-)	U	U
Ohio	U	U	U
Oklahoma	-	-	-
Oregon	U	-	-
Pennsylvania	U	U	U
Rhode Island	-	-	-
South Carolina	U	(B-)	U
Tennessee	U	U	U
Texas	B	U	U
Utah	-	B	B
Vermont	-	-	-
Virginia	U	U	U
Washington	U	(B-)	(B-)
West Virginia	U	U	U
Wisconsin	U	U	U
Wyoming	U	U	B

SOURCE: Association for School, College and University Staffing, "A Current Assessment of Teacher Supply and Demand in the U.S.," October 1976.

U- undersupply; B- balanced; O- oversupply

Table 1-b. -- Projected Expansion of State Services in Male-Intensive Vocational Training at the Secondary School Level

States	Projections for 1978
<u>California</u>	Firefighter, police and other public service training are emphasized at secondary levels. A major priority are pre-vocational programs at the junior high school level.
<u>Illinois</u>	Expansion of orientation programs for students in grades 9 and 10.
<u>New York</u>	Expansion of pre-vocational programs at the secondary level.
<u>Texas</u>	Shift of students out of agricultural production, into agribusiness courses.
<u>Florida</u>	Provide entry-level training to 30% of all secondary students.
<u>Ohio</u>	Career exploration to increase 10-fold to 247,000.
<u>North Carolina</u>	Boost by 50% enrollments in trade and industry programs.
<u>Virginia</u>	Treble secondary trade and industry enrollments. Plans include new emphasis on agricultural resources management.
<u>New Jersey</u>	Expansion of orientation programs for the disadvantaged and handicapped.
<u>Pennsylvania</u>	Five-fold increase in secondary minority enrollments to 21,000.
<u>Michigan</u>	Expand orientation and career counseling to all school districts.
<u>Georgia</u>	None at secondary level.
<u>Wisconsin*</u>	Emphasis on secondary trade and industrial programs.
<u>Minnesota</u>	Ten-fold increase in pre-vocational programs at junior high level, to 100,000; increase in grade 10 exploratory courses to 50,000.
<u>Washington</u>	None at secondary level.
<u>Maryland</u>	Modest increases in all areas.
<u>Alabama</u>	Emphasis on secondary level trade and industrial programs.

Based on Projected Data for 1978 in the State Plans, in descending order based on total number of vocational education enrollment.

Table 1-b. -- Projected Expansion of State Services in Male-Intensive Vocational Training at the Secondary School Level (Continued)

States	Projections for 1978
<u>Kentucky</u>	Expansion of secondary level orientation programs, to keep disadvantaged from dropping out of school.
<u>Louisiana</u>	None at secondary level.
<u>Connecticut</u>	None at secondary level.
<u>Massachusetts</u>	None at secondary level.
<u>Iowa*</u>	Emphasis on secondary agriculture.
<u>Tennessee</u>	New vocational/technical legislation, aims to expand occupational training to 50% of all students in grades 9-12. Goals include expansion of orientation programs to 100% of 7-8 grade students.
<u>Indiana</u>	Emphasis on secondary counseling.
<u>Arizona</u>	None at secondary level.
<u>Oregon</u>	Expansion of orientation programs to all 7-10 grades. Treble secondary cooperative enrollments to 13,500.
<u>Mississippi</u>	Expand secondary level orientation programs.
<u>South Carolina</u>	Emphasis on trade and industrial education.
<u>Arkansas</u>	None at secondary level.
<u>Oklahoma</u>	Emphasis on secondary trade and industrial programs.
<u>Colorado</u>	Emphasis on secondary trade courses.
<u>Utah</u>	Emphasis on secondary agri-business courses.
<u>Missouri</u>	None at secondary level.
<u>Kansas</u>	Double secondary cooperative programs.
<u>Nebraska</u>	No male-intensive programs being expanded.
<u>New Mexico</u>	None at secondary level.

* Based on 1977 projections, data for 1978 not available.

Table 1-b. -- Projected Expansion of State Services in Male-Intensive Vocational Training at the Secondary School Level (Continued)

States	Projections for 1978
<u>West Virginia</u>	Enroll 50% of all 10th graders in occupational programs; treble number of secondary students served by guidance program.
<u>Delaware</u>	Career orientation for secondary students is emphasized; industrial education is emphasized at all levels.
<u>Hawaii</u>	Increase in trade and industrial education by 200%; in agriculture by 45%.
<u>Maine</u>	No expansion of male-intensive programs.
<u>New Hampshire</u>	Increase trade and industrial programs, particularly in plastics, at secondary level.
<u>North Dakota</u>	Double trade and industrial enrollments.
<u>Idaho</u>	No expansion of male-intensive programs.
<u>Nevada</u>	Increase secondary enrollments in occupational programs by 180%.
<u>Montana</u>	No expansion of male-intensive programs.
<u>South Dakota</u>	No expansion of male-intensive programs.
<u>Rhode Island</u>	Increase trade and industrial education at secondary levels.
<u>Alaska</u>	Treble technical enrollments, and double enrollments in other programs, in anticipation of pipeline development.
<u>Wyoming</u>	Career Counseling at all levels.
<u>Vermont</u>	No expansion of male-intensive programs.
<u>District of Columbia</u>	A major restructuring of vocational education is planned.

Table 1-c. -- Employment Outlook on Occupations Corresponding to Trade and Industrial Education, 1973 to 1978, by Course

Occupation	Employment Outlook and Projected Expansion, 1973 - 1978
Air Conditioning	Good - 13%
Appliance Repair	Good - 10%
Auto Body and Fender Repair	Good - 14%
Auto Mechanics	Good - 12%
Business Machine Maintenance	Very Good, but limited - 30%
Commercial Fishery Occupations	Good, but limited - 17%
Carpentry	Very good - 15%
Electricity	Very good - 16%
Masonry	Very good - 15%
Plumbing and Pipefitting	Very good - 17%
Other Construction and Maintenance Trades	Very good - 16%
Custodial Services	Good - 13%
Diesel Mechanic	Good, but limited - 10%
Drafting Occupations	Good - 10%
Electrical Occupations	Very good - 15%
Electronic Occupations	Very good - 15%
Foremanship, Supervision	Good - 15%
Graphic Arts Occupations	Very good - 22%
Instrument Maintenance and Repair	Fair - 9%
Maritime Occupations	Limited - 3%
Machine Shop	Good - 11%
Metallurgy	Very good, but limited - 14%
Barbering	Very good, but limited - 25%
Firefighters	Very good - 26%
Law Enforcement Agent	Good - 22%
Refrigeration	Good, but limited - 12%
Small Engine Repair	Good - 10%
Stationary Energy Sources Occupations	Limited - 5%
Leatherworking	Limited - 5%
Woodworking	Very good - 17%

SOURCE: Tomorrow's Manpower Needs, Volume IV, Revised 1971, Washington, D.C.: U.S. Department of Labor, Bureau of Labor Statistics.

Table 1-d. -- Employment Outlook on Occupations Corresponding to Technical Education, 1973 to 1978, by Course

Course	Employment Outlook, and Projected 1973-1978 Growth Rate
Aeronautical Technology	Good - 11% expansion
Architectural Technology	Very good - 25%
Automotive Technology	Good - 12%
Civil Technology	Good - 15%
Electrical Technology	Very good - 18%
Electronics Technology	Good - 15%
Environmental Control Technology	Very good - 20%
Industrial Technology	Very good - 31%
Mechanical Technology	Good - 13%
Metallurgical Technology	Good - 14%
Fire and Safety Technology	Very good - 26%
Forestry Technology	Very good - 17%
Police Science Technology	Very good - 22%

SOURCE: Tomorrow's Manpower Needs, Volume IV, Revised 1971, U.S. Department of Labor, Bureau of Labor Statistics.

Table 1-e. -- Number of Persons and Percent Women Employed in Selected Occupations, 1976

Office of Education Classification	Occupational Title	Total Men and Women (in thousands)	Percent Women
MALE-INTENSIVE OCCUPATIONS			
17.1001 Carpentry	Carpentry	1,021	.7
17.1004 Masonry	Brickmasons and Stonemasons	177	.6
17.1002 Electricity	Electricians	572	.3
17.1003 Heavy Equipment (Construction)	Excavation, Grading and Road Machinery Operators	418	.5
17.1005/6 Painting and Decorating, Plastering	Painters, Construction and Maintenance	413	2.9
17.1007 Plumbing and Pipefitting	Plumbers and Pipefitters	400	0.8
17.2302 Machine Shop	Machinists and Job Setters	570	2.5
17.23 Metalworking	Metal Craft Workers, excluding Mechanics, Machinists, and Job Setters	629	3.2
17.2305 Sheetmetal	Sheetmetal Workers and Tinsmiths	145	2.1
17.2307 Tool and Die Making	Tool and Die Makers	188	2.1
17.0302 Auto Mechanics	Mechanics, Automobiles	1,124	.6
17.01 Air Conditioning	Air Conditioning, Heating, and Refrigeration Mechanics	178	.6
17.0401 Aircraft Mechanic	Aircraft Mechanics	110	.9
17.02 Appliance Repair	Household Appliances and Accessory Installers and Mechanics	144	2.1
17.06 Business Machine Maintenance	Office and Machine Repairers	58	1.7
17.1503 Radio/Television	Radio and Television Repairers	114	3.5
17.19 Graphic Arts	Printing Craft Workers	380	19.2
17.1901 Composition, Makeup and Typesetting	Compositers and Typesetters	152	24.3
17.1902 Printing Press Occupations	Printing Press Operators	149	9.4
17.3601 Millwork and Cabinetmaking	Cabinetmakers	78	2.6
17.32 Stationary Energy	Stationary Engineers	194	.5
17.1402 Linemen	Electric Power Line and Cable Installers and Repairers	110	.9
17.1501 Communications	Telephone Installers and Repairers	282	5.0
	Telephone Line Installers and Repairers	65	1.5
FEMALE-INTENSIVE OCCUPATIONS			
14.0101 Tellers	Bank Tellers	371	91.1
14.0102 Bookkeepers	Bookkeepers	1,688	90.0
14.0102 Bookkeepers	Billing Clerk	139	87.1
14.0103 Cashiers	Cashiers	1,256	87.7
14.0302 File Clerks	File Clerks	269	85.5
14.0201 Key punch and Coding Equipment Operators	Key punch Operators	276	93.5
14.0401 Receptionists and Information Clerks	Receptionists	502	96.2
14.0702 Secretaries	Secretaries	3,385	99.0
14.0703 Stenographers	Stenographers	100	89.0
--	Teacher's Aides	320	90.9
14.0401 Communications Systems Clerk and Operators	Telephone Operators	339	94.4
14.0902 Typists	Typists	983	96.7
--	Prekindergarten and Kindergarten Teachers	228	98.2
--	Elementary School Teachers	1,383	84.8
--	Secondary School Teachers	1,188	50.5
07.0301 Nursing	Registered Nurses	999	96.6
--	Health Service Workers	1,745	86.2
07.0101 Dental Assisting	Dental Assistants	122	98.4
07.0302 Practical (Vocational) Nursing	Practical Nurses	381	97.4
07.0303 Nursing Assistance	Nursing Aides, Orderlies, etc.	1,002	86.8
--	Health Aides and Trainees	240	84.2
--	Private Household Workers	1,125	97.3
--	Childcare Workers	429	98.1
--	Cleaners and Servants	553	97.1
--	Housekeepers	109	96.3
--	Waiters/Waitresses	471	90.7
--	Sewers and Stitchers	812	95.9

SOURCE: U.S. Department of Labor, Employment and Earnings, January, 1977.

Table 2-a

Selected Male-Intensive Vocational Education Courses by Occupational Titles, by Number of Year of Training

Vocational Education Course	Number of Years of Occupational Preparation		
	1 - 2 Years	3 - 4 Years	5 - 10 Years
Air Conditioning	Evaporation Cooler Installer		Air Conditioning Mechanic
Plumbing and Pipefitting	Pipefitter I, Construction Pipefitter, Maintenance Plumber		
Electronic Occupations	Telephone Installer Repairer		
Graphic Arts	Bookbinder		
Small Engine Repair	Motorcycle Repair	Motorboat Mechanic	Compositor I Electotyper Photoengraver
Woodworking	Cabinetmaker	Furniture Finisher	
Body and Fender		Auto Body Repairer	
Auto Mechanic		Auto Mechanic	
Carpentry Construction		Rough Carpenter	Construction Carpenter
Electricity		Electrician	
Drafting		Architectural Drafter Drafter (Aeronautical, Electrical, Civil)	
Electrical Occupations		Line Erector Line Repairer Line Installer (telephone)	
Electronic Occupations		TV and Radio Repair	Cable Installer

Table 2-a. (Continued)

Selected Male-Intensive Vocational Education Courses by Occupational Titles, by Number of Years of Training (Continued)

Vocational Education Course	Number of Years of Occupational Preparation		
	1 - 2 Years	3 - 4 Years	5 - 10 Years
Machine Shop		Machinist	
Welding and Cutting	Welder, Combination Welder, Repair Arc Welding Machine Operator	Job and Die Setter Welder, Fitter	
Masonry	Cement Mason	Stone Mason	Bricklayer Bricklayer (Construction)
SOURCE: U.S. Department of Labor, Manpower Administration. <u>Selected Characteristics of Occupations, A Supplement to the Dictionary of Occupational Titles</u>, Third Edition, 1966.			

Table 3-a. -- Enrollment of Men and Women in Secondary Male-Intensive Vocational Education Programs, by State

Occupations	States																	
	AL	AK	AZ	AR 1/	CA	CO	CT	DE	DC	FL	GA	HI	ID	IL 1/	IN 1/	IA	KS	
Air Conditioning	1576	--	115	157	1611	--	210	--	7	1324	1161	--	--	411	345	--	72	
Appliance Repair	277	--	11	131	1023	106	163	56	49	563	25	--	51	581	185	--	19	
Auto Body/Fender	1568	63	444	269	5026	697	196	165	78	1334	--	--	54	2126	1433	236	291	
Auto Mechanics	2912	600	2179	1613	25,757	3278	872	548	184	7031	875	946	1185	25,966	3225	796	1074	
Other Automotive	302	--	386	75	8055	504	447	27	--	330	2282	111	6	1872	400	236	292	
Aviation	44	42	111	10	1204	5	16	57	--	951	31	--	2	743	48	55	23	
Business Machine Maintenance	52	--	7	7	292	25	--	39	22	77	317	--	1	127	--	--	2	
Commercial Fishery	56	178	--	2	83	--	--	--	--	--	--	--	--	--	--	--	--	
Carpentry	953	230	219	1131	4615	686	951	326	49	1955	318	--	15	16,183	919	552	431	
Electricity	495	110	15	4	424	73	914	--	105	871	255	--	1	3251	149	--	12	
Masonry	1032	--	35	69	1133	117	105	--	71	2177	104	--	3	166	177	--	38	
Plumbing/Pipefitting	64	--	--	14	--	57	449	31	45	390	13	--	2	66	17	--	12	
Other Construction and Maintenance	297	56	608	60	9943	721	223	218	--	1594	2412	529	10	5099	1612	167	101	
Custodial Services	292	--	--	222	--	614	15	14	--	558	139	--	31	801	76	23	41	
Diesel Mechanic Training	157	--	63	18	581	7	82	42	14	199	15	--	1	181	193	39	44	
Drafting	1520	821	225	71	14,915	12	657	377	117	1949	2680	186	34	28,791	827	29	148	
Electrical	--	15	29	285	566	66	31	294	139	913	1126	--	1	6383	174	131	84	
Electronics	2386	215	320	42	12,268	31	874	369	27	3311	838	--	246	8406	955	72	207	
Graphic Arts	720	256	220	323	14,156	576	643	141	110	1322	1491	235	31	12,957	902	99	422	
Instrument Maintenance and Repair	5	--	--	4	97	--	51	--	19	1	9	--	--	25	3104	--	1	
Maritime	--	--	--	--	--	--	--	--	--	665	--	--	--	3	--	--	--	
Metalworking	2983	674	760	877	7610	1640	2020	816	105	2683	2527	158	800	30,240	59	931	809	
Metallurgical	--	--	--	6	--	--	--	46	20	--	--	--	--	370	--	--	--	
Barbering	97	--	--	--	--	--	35	38	64	18	216	--	1	32	--	--	--	
Fireman Training	--	--	106	--	1936	--	--	--	--	--	1	--	--	32	--	--	2	
Law Enforcement	--	--	38	20	4916	3	--	--	--	1596	--	--	14	104	--	22	27	
Refrigeration	45	19	5	31	78	--	--	--	--	22	85	--	--	7	39	21	4	
Small Engine Repair	283	134	11	26	4860	268	85	48	40	2422	39	--	25	1983	193	415	124	
Stationary Energy Sources	--	606	--	2	--	--	--	17	--	139	2	--	--	63	--	--	5	
Leatherworking	139	--	--	19	--	4	--	--	53	9	--	--	1	89	3	--	--	
Woodworking	303	871	103	37	11,996	91	--	73	47	574	321	--	2	22,803	347	48	71	
TOTAL	18,308	4890	6010	5525	133,145	21,164	9040	3742	1365	34,978	17,282	2165	2517	171,771	15382	3872	4256	
Industrial Arts	7823 2/	--	5898	2822 2/	18,458	--	--	7452	--	94,731	12,041	--	3228 2/	151,514	11846	100002/	3928	
Technical	--	--	--	5	890	1215	--	109	--	863	--	330	--	--	--	--	81	
Agriculture	8846	25	2223	17,576	42,081	3525	982	852	--	6828	33,589	1025	5244	25,092	14,700	17,833	8527	

SOURCE: FY 75 State Annual Report.

1/ FY 76 Data; 2/ FY 77 State Plan Data; 3/ FY 75 State Plan Data.

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Table 3-a. -- Enrollment of Men and Women in Secondary Male-Intensive Vocational Education Programs, by State (Continued)

Occupations	States																	
	AK	LA	ME	ND	PA	RI	SD	TX	VA	MT	NE*	NV	NH	NJ	NM	NY	NC	
Air Conditioning	399	545	66	486	291	534	118	70	406	--	--	32	--	1048	4	2021	74	
Appliance Repair	302	79	21	182	104	297	113	32	--	95	39	13	--	483	4	506	--	
Auto Body/Fender	--	248	129	669	--	1640	509	377	--	5	29	167	--	1170	128	--	285	
Auto Mechanics	3393	2254	853	3445	4289	9418	4836	2170	3061	900	1105	1332	525	3477	1231	27994	7444	
Other Automotive	--	--	--	172	56	159	769	72	188	12	27	120	--	478	141	--	2574	
Aviation	--	--	10	--	--	350	75	2	246	--	--	28	--	100	2	1040	456	
Business Machine Maintenance	94	210	1	22	62	106	7	1	18	--	--	2	--	3	2	--	59	
Commercial Fishery	--	14	53	--	--	333	--	1	1	--	--	1	--	--	--	--	58	
Carpentry	1916	829	874	432	3663	4763	2800	509	2612	651	978	797	563	1514	712	--	5527	
Electricity	729	151	123	--	3023	209	202	341	325	41	3	292	--	706	38	--	4464	
Masonry	271	291	15	950	125	47	59	460	100	--	1	19	--	376	1	--	6274	
Plumbing/Pipefitting	63	114	104	231	840	42	56	49	119	--	2	10	--	701	13	--	232	
Other Construction and Maintenance	60	230	156	120	602	375	561	2601	197	--	5	512	10	2016	37	11523	39	
Custodial Services	59	--	90	60	59	403	561	92	260	--	8	--	6	425	25	710	--	
Diesel Mechanic Training	82	532	8	135	87	247	13	4	150	--	346	8	--	307	5	--	--	
Drafting	1182	475	352	1432	1675	1882	845	741	591	951	399	653	313	2215	92	5447	10656	
Electrical	1082	--	210	1206	990	1067	79	461	156	--	200	53	122	1246	5	6789	318	
Electronics	325	594	114	1192	1702	2391	1003	212	1121	536	406	105	163	1827	390	4483	168	
Graphic Arts	279	425	227	1446	2375	2431	1990	124	1076	144	85	42	126	1247	260	3596	2663	
Instrument Maintenance and Repair	--	--	--	--	79	13	61	--	26	--	--	--	--	--	4	--	--	
Maritime	--	209	1	38	--	8	1	--	--	--	--	--	--	81	1	595	252	
Metalworking	3074	2018	415	1514	5092	6703	2740	1884	2642	1662	516	826	874	3508	498	7968	1869	
Metallurgical	--	--	75	--	747	15	20	--	8	--	--	2	--	--	3	--	--	
Barbering	--	--	1	26	--	--	--	--	2	--	--	--	--	11	--	--	--	
Fireman Training	--	--	2	--	--	--	--	--	2	--	--	23	20	--	--	--	--	
Law Enforcement	50	--	13	--	--	295	1	--	29	--	--	79	--	10	1	143	--	
Refrigeration	43	--	--	--	17	59	23	38	362	--	--	76	--	--	32	--	--	
Small Engine Repair	92	405	153	135	325	1980	875	71	640	734	--	111	58	391	44	--	995	
Stationary Energy Sources	--	--	--	--	110	--	20	1	1	--	--	--	--	108	--	--	--	
Leatherworking	--	37	102	19	47	4	4	110	5	--	--	--	--	--	1	--	3	
Woodworking	82	177	103	541	1294	411	782	56	248	--	23	729	--	690	80	--	2952	
TOTAL	13577	9837	4335	14423	27630	36152	18819	10479	14592	5731	4172	6030	2772	24112	3761	67595	47364	
Industrial Arts	71000 2/	6377	2365	68000 2/	3013	--	16411 3/	27072	--	6600 2/	392 2/	--	20176	--	6553	--	9419	
Technical	107	--	--	216	710	--	--	--	353	84	--	924	--	1383	--	6925	--	
Agriculture	5614	19361	1067	2930	890	11926	14689	14077	15926	3739	7765	561	1100	1166	4766	5345	18693	

*1976

Table 3-a. -- Enrollment of Men and Women in Secondary Male-Intensive Vocational Education Programs, by State (Continued)

Occupations	States																	
	ND	OH	OK	OR	PA	RI	SC	SD	TN	TX	UT	VT	VA	WA	WV	WI	WY	
Air Conditioning	-	465	551	-	1,240	101	1,212	-	243	1,416	-	-	555	-	254	-	-	
Appliance Repair	-	499	86	-	1,171	-	149	-	191	449	3	-	17	-	83	385	-	
Auto Body/Fender	104	2,217	735	-	3,750	291	802	77	689	2,238	697	-	987	129	498	2,225	-	
Auto Mechanics	846	5,935	2,552	3,394	7,404	640	3,546	530	3,099	9,538	4,483	633	4,666	1,641	1,152	4,408	418	
Other Automotive	-	237	64	-	1,012	-	219	-	417	7,596	303	82	361	300	153	1,797	-	
Aviation	-	146	244	-	54	-	6	-	80	326	48	26	9	85	-	642	16	
Business Machine Maintenance	-	136	4	-	57	-	113	-	16	39	15	18	11	-	35	-	-	
Commercial Fishery	-	-	-	-	-	-	-	-	9	-	-	-	2	25	-	-	-	
Carpentry	-	1,996	2,046	-	4,687	645	3,138	348	1,076	626	1,252	-	1,170	335	468	3,552	205	
Electricity	-	1,104	292	-	1,616	119	2,675	-	256	248	523	-	21	-	150	-	89	
Masonry	-	344	397	-	1,998	-	2,946	-	591	574	20	-	2,150	-	240	-	-	
Plumbing/Pipefitting	-	81	95	-	1,294	-	483	-	69	642	18	-	244	-	22	-	-	
Other Construction and Maintenance	417	2,164	64	2,136	3,063	296	64	-	1,442	12,905	28	670	6,975	97	1,541	2,268	-	
Custodial Services	88	110	206	-	237	19	134	-	153	-	-	42	239	32	671	257	-	
Diesel Mechanic Training	132	368	439	-	664	-	-	-	5	233	48	33	12	-	107	-	-	
Drafting	-	2,306	777	149	1,673	318	1,017	40	1,808	1,919	1,690	326	1,779	103	837	3,081	77	
Electrical	73	296	124	-	1,943	205	-	-	454	1,313	317	195	1,482	-	699	1,326	33	
Electronics	152	3,029	778	980	1,126	192	560	283	1,196	2,762	659	170	1,644	682	286	2,396	21	
Graphic Arts	57	1,782	491	485	2,423	106	915	47	542	1,516	283	77	716	479	226	3,038	104	
Instrument Maintenance and Repair	-	-	7	-	-	-	2	-	2	59	10	-	11	-	-	-	-	
Maritime	-	-	-	-	-	-	-	-	-	228	-	-	7	135	-	-	-	
Metalworking	428	7,192	1,882	1,620	8,972	539	2,709	413	3,206	5,780	1,378	215	2,172	706	2,452	9,158	341	
Metallurgical	-	-	7	-	-	-	-	-	-	-	-	-	6	-	-	-	-	
Barbering	-	30	1	-	-	11	-	-	3	42	-	-	55	-	-	-	-	
Fireman Training	-	24	2	-	-	-	-	-	2	-	-	15	18	-	-	-	-	
Law Enforcement	-	113	13	-	46	12	-	-	2	-	15	17	12	-	-	-	-	
Refrigeration	-	52	13	-	98	-	-	-	210	-	15	-	3	24	-	-	-	
Small Engine Repair	161	425	204	-	491	31	561	-	355	391	221	90	952	148	311	1,112	48	
Stationary Energy Sources	-	19	1	-	107	-	-	-	1	41	-	-	1	-	-	-	-	
Leatherworking	-	79	6	-	85	-	1	-	87	122	10	-	48	-	11	-	-	
Woodworking	-	248	18	-	1,572	89	120	-	997	589	1,324	23	160	36	130	2,268	97	
TOTAL	2,458	31,397	12,159	8,564	46,183	3,612	21,372	1,738	17,201	51,692	13,360	2,636	26,485	4,957	10,326	37,913	1,449	
Industrial Arts	-	-	47,200	20,432	386,787	2,064	6,393	-	579	34,886	38,016	16,500	37,969	221	11,759	-	255	
Technical	-	-	55	-	5,105	102	-	-	294	1,164	-	-	-	-	462	-	3	
Agricultural	5,667	20,614	16,035	4,237	1,470	633	10,869	3,843	16,982	60,096	2,849	854	6,523	19,960	4,634	16,583	1,809	

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Table 3-b. -- National Enrollment in Industrial Arts, 1973

	(in thousands)
General Industrial Arts	1,005.5
General Industrial Arts	495.0
General Industrial Arts	104.0
General Industrial Arts	62.0
Industrial Arts for Girls	16.7
Exploratory Industrial Arts	68.7
Building and Construction	61
Carpentry and Woodworking	45.5
General Woods	852.6
Crafts	155.9
Jewelry Art Metalworking	67.6
Leather, Textiles, Upholstery	28.3
Plastics	65.5
Drafting and Drawing	406.7
Drafting, Drawing and Other Special Drawing	53.0
Mechanical Drawing	352.2
Electricity/Electronics	21.4
Electricity	266.8
Graphic Arts	190.4
Photography	50.0
Printing and Photolithography	33.5
Applied Shop	30.0
Industrial Arts Mathematics and Science	26.0
Manufacturing	42.7
Industrial Materials, Technology and Processes	31.5
Metalworking	513.7
Welding	53.6
Auto Mechanics	194.0
Power Mechanics	125.0

SOURCE: Market Data Retrieval, The Guide to Vocational Education in America: Trends to 1978.

Table 3-c

Teacher Employment in Secondary Male-Intensive Vocational Programs, By State

Occupations	States																		
	AL	AK	AZ ^{1/}	AR	CA	CO	CT	DE	DC	FL	GA	HI	ID	IL ^{1/}	IN ^{1/}	IA	KS	KY	
Air Conditioning	42	-	3	3	3	-	7	-	1	38	27	-	-	7	12	-	4	10	
Appliance Repair	6	-	-	3	6	4	5	1	1	16	1	-	1	10	7	-	1	9	
Auto Body/Fender	2	2	18	6	38	28	7	4	1	37	67	-	1	36	51	8	16	3	
Auto Mechanics	77	20	90	33	230	133	29	14	2	199	20	11	23	438	114	26	58	97	
Other Automotive	8	-	38	2	180	20	15	1	-	9	67	1	1	32	14	8	16	-	
Aviation	1	1	4	1	16	1	1	1	-	27	1	-	1	13	2	2	1	-	
Business Machine Maintenance	1	-	-	1	1	1	-	1	1	2	7	-	1	2	-	-	1	3	
Commercial Fishery	1	6	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	
Carpentry	25	8	10	23	34	28	32	8	1	56	7	-	1	273	33	18	23	55	
Electricity	13	4	1	1	3	3	31	-	1	24	6	-	1	55	5	-	1	21	
Masonry	27	-	1	1	3	5	4	-	1	60	2	-	1	3	6	-	2	8	
Plumbing/Pipefitting	2	-	-	1	1	2	15	1	1	11	1	-	1	1	1	-	1	2	
Other Construction and Maintenance	8	2	27	1	45	29	7	3	-	44	56	6	1	85	57	5	5	2	
Custodial Services	8	-	-	5	5	25	1	1	-	15	3	-	1	14	3	1	2	2	
Diesel Mechanic Training	4	-	1	1	3	1	3	1	-	6	1	2	1	3	7	1	2	2	
Drafting	40	28	16	13	172	1	22	9	1	55	62	-	1	486	29	1	8	34	
Electrical	-	1	4	2	17	3	1	7	2	25	26	-	1	108	6	4	5	31	
Electronics	63	7	19	6	150	1	29	9	1	92	20	-	5	142	34	2	11	10	
Graphic Arts	19	9	11	7	167	23	22	3	1	37	35	3	6	219	32	3	23	8	
Instrument Maintenance and Repair	1	-	-	1	1	-	2	-	1	1	1	-	-	1	-	-	1	-	
Maritime	-	-	-	-	1	-	-	-	-	18	-	-	-	1	-	-	-	-	
Metalworking	73	23	50	18	250	65	68	13	-	75	59	2	16	510	111	31	52	87	
Metallurgical	-	-	-	1	-	-	-	1	2	-	-	-	-	6	-	-	-	-	
Barbering	3	-	-	-	-	-	1	1	1	1	5	-	1	1	2	-	-	-	
Fireman Training	-	-	-	-	11	-	-	-	1	-	1	-	-	1	-	-	1	-	
Law Enforcement	-	-	-	1	53	-	-	-	-	46	-	-	1	2	-	1	1	1	
Refrigeration	1	1	1	1	1	-	-	-	-	1	2	-	-	1	1	1	1	1	
Small Engine Repair	8	5	1	1	41	11	3	1	1	125	1	-	1	67	7	14	7	3	
Stationary Energy Sources	-	21	-	1	-	-	-	1	-	-	1	-	-	1	-	-	1	-	
Leatherworking	1	-	-	1	1	1	-	-	1	1	-	-	1	2	1	-	-	-	
Woodworking	3	30	8	1	142	4	-	2	1	16	7	-	1	385	12	2	4	2	
TOTAL	490	168	303	127	1572	385	305	81	18	1036	481	25	55	2900	545	127	424	412	
Industrial Arts	55	-	875	480	-	-	1150	-	146	563	110	-	-	-	-	-	-	480	
Technical	-	-	-	-	31	54	-	5	-	32	-	4	-	-	-	-	-	9	
Agricultural	132	1	71	236	451	94	28	16	-	136	288	8	70	431	26	251	152	93	

SOURCE: FY75 State Annual Report

1/ 1976 Data; 2/ FY77 State Plan Data; 3/ FY75 State Plan Data;
4/ FY75 State Plan Data.

Table 3-c (Cont'd)

Teacher Employment in Secondary Male-Intensive Vocational Programs, By State

Occupations	States																	
	LA	ME	MD	MA	MI	MN	MS	MO	MT	NE	NV	NH	NJ	NM	NY	NC	ND	
Air Conditioning	12	2	12	25	17	3	2	17	-	-	1	-	48	41	47	3	-	
Appliance Repair	8	1	7	5	9	3	1	6	2	1	41	-	22	41	22	11	-	
Auto Body/Fender	7	3	17	69	51	11	12	58	-	1	3	-	53	4	104	8	2	
Auto Mechanics	50	23	81	221	293	108	70	127	15	7	23	13	158	36	352	152	22	
Other Automotive	-	-	9	3	5	17	2	8	41	3	2	-	22	4	62	41	-	
Aviation	-	41	-	-	11	2	41	10	-	-	4	-	5	41	132	7	-	
Business Machine Maintenance	5	41	1	3	3	41	41	1	-	-	41	-	41	41	16	2	-	
Commercial Fishery	-	1	-	-	-	-	41	41	-	-	41	-	-	-	3	41	-	
Carpentry	18	23	33	189	148	63	17	109	10	13	14	14	69	21	153	108	-	
Electricity	3	3	-	156	6	5	11	14	1	41	5	-	32	1	-	72	-	
Masonry	6	41	25	6	1	1	15	4	-	41	41	-	17	41	26	124	-	
Plumbing/Pipefitting	3	3	7	43	1	1	2	5	-	41	41	-	32	41	50	8	-	
Other Construction and Maintenance	5	4	4	31	12	13	84	8	-	-	9	41	91	1	122	221	16	
Custodial Services	-	2	4	3	13	9	3	11	-	-	-	41	19	1	2	4	1	
Diesel Mechanic Training	-	41	51	4	8	41	41	6	-	41	41	-	14	41	9	1	-	
Drafting	12	9	31	87	59	19	24	25	16	6	11	8	100	3	248	183	5	
Electrical	11	6	36	51	33	2	15	6	-	-	1	3	57	1	219	1	-	
Electronics	-	3	27	88	74	23	7	47	9	6	2	4	83	12	212	3	9	
Graphic Arts	13	6	38	23	76	45	4	45	2	1	1	3	56	8	141	46	3	
Instrument Maintenance and Repair	9	-	-	4	41	1	41	1	-	-	-	-	-	41	1	41	-	
Maritime	-	41	-	-	41	41	-	-	-	-	-	-	4	41	21	6	-	
Metalworking	5	11	49	263	208	62	62	109	27	5	14	21	160	15	303	41	12	
Metallurgical	44	2	1	39	41	41	-	41	-	-	1	11	-	41	-	41	-	
Barbering	-	41	-	-	-	-	-	41	-	-	-	-	1	-	6	41	-	
Fireman Training	-	41	-	-	-	-	-	41	-	-	41	41	-	-	-	41	-	
Law Enforcement	-	41	-	-	9	41	-	1	-	-	1	-	1	41	-	1	-	
Refrigeration	-	-	-	1	2	1	1	15	-	41	1	-	-	1	22	2	-	
Small Engine Repair	9	4	1	17	62	20	2	27	12	-	2	1	18	1	53	36	5	
Stationary Energy Sources	-	-	-	6	-	41	41	41	-	-	-	-	5	-	-	-	-	
Leatherworking	1	3	2	1	41	41	4	41	-	-	-	-	-	41	-	1	-	
Woodworking	4	3	15	67	13	18	2	10	-	1	12	-	31	2	50	54	-	
TOTAL	225	113	404	1,026	1,114	427	309	670	94	44	106	78	1,098	110	2,376	1,135	75	
Industrial Arts	314	342	572	77	-	-	222	-	200	543	-	290	-	55	9800	62	-	
Technical	-	-	6	49	-	-	-	14	2	-	15	-	69	-	125	-	-	
Agricultural	248	13	52	66	132	200	222	296	62	111	17	21	41	68	333	212	88	

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Table 3-c. (Cont'd)

Teacher Employment in Secondary Male-Intensive Vocational Programs, By State

Occupations	States																
	OH	OK	OR	PA	RI	SC	SD	TN	TX	UT	VT	VA	WA	WV	WI	WY	
Air Conditioning	22	18	-	35	2	63	-	7	51	-	-	15	-	9	-	-	
Appliance Repair	22	3	-	33	-	8	-	5	18	◀1	◀1	1	-	3	4	-	
Auto Body/Fender	104	23	-	107	6	39	2	19	78	10	5	24	5	17	25	-	
Auto Mechanics	268	81	101	211	12	172	17	85	394	66	25	129	69	39	49	17	
Other Automotive	12	2	-	29	-	-	-	11	251	5	3	14	12	5	20	-	
Aviation	6	8	-	2	-	-	-	2	10	1	1	1	3	-	7	1	
Business Machine Maintenance	7	◀1	-	2	-	6	-	◀1	2	◀1	1	◀1	-	1	-	-	
Commercial Fishery	3	-	-	-	-	-	-	◀1	-	-	-	-	1	-	-	-	
Carpentry	90	65	-	134	12	162	11	30	24	19	-	62	15	16	39	8	
Electricity	5	9	-	46	2	137	-	7	9	8	-	47	-	5	-	4	
Masonry	17	13	-	57	-	149	-	16	18	◀1	-	75	-	8	-	-	
Plumbing/Pipefitting	5	3	-	37	-	25	-	2	23	◀1	-	8	-	1	-	-	
Other Construction and Maintenance	55	2	63	10	3	2	-	40	486	◀1	27	62	4	52	25	-	
Custodial Services	7	7	-	7	◀1	-	-	4	-	-	2	7	◀1	23	3	-	
Diesel Mechanic Training	26	14	-	19	-	-	-	◀1	7	1	1	1	-	4	-	-	
Drafting	105	25	4	48	6	51	1	50	70	25	13	65	6	28	34	3	
Electrical	15	4	-	55	4	-	-	12	47	5	8	6	-	24	15	1	
Electronics	139	25	32	4	4	35	9	33	94	10	7	59	23	10	27	1	
Graphic Arts	81	16	14	69	2	49	1	15	52	4	3	21	17	8	34	4	
Instrument Maintenance and Repair	1	◀1	-	-	-	-	-	◀1	2	◀1	-	19	-	-	-	-	
Maritime	-	-	-	-	-	-	-	-	5	-	-	◀1	5	-	-	-	
Metalworking	288	61	48	256	7	140	13	89	206	20	11	61	32	83	101	14	
Metallurgical	1	◀1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Barbering	1	1	-	-	◀1	-	-	◀1	-	-	-	2	-	-	-	-	
Fireman Training	2	◀1	-	-	-	-	-	◀1	-	-	1	◀1	-	-	-	-	
Law Enforcement	5	◀1	-	1	◀1	-	-	◀1	-	◀1	1	1	-	-	-	-	
Refrigeration	5	◀1	-	3	-	-	-	6	-	◀1	-	2	◀1	-	-	-	
Small Engine Repair	22	7	-	14	1	17	-	10	15	3	4	16	4	11	12	2	
Stationary Energy Sources	1	◀1	-	3	-	-	-	◀1	1	-	-	-	-	-	-	-	
Leatherworking	4	◀1	-	2	-	-	-	2	5	◀1	-	-	-	◀1	-	-	
Woodworking	12	4	-	45	2	7	-	27	20	20	1	14	2	4	25	4	
TOTAL	1331	390	259	1251	63	1062	54	472	1889	191	114	712	197	351	420	59	
Industrial Arts	-	-	714	3408	225	154	-	21	1914	-	228	256	-	-	-	-	
Technical	-	-	-	249	2	-	-	11	55	-	-	-	-	16	-	-	
Agricultural	520	357	120	305	5	452	62	225	1396	48	21	108	148	82	209	46	

Table 3-dNational Teacher Employment in Secondary
Male-Intensive Vocational Programs

Code	Title	Number of Teachers
01	<u>AGRICULTURE</u> Total # of Teachers in Male-Intensive Occupations (FTE) 1/	8,867
01.01	Agricultural Production	5,999
01.02	Agricultural Supplies/Services	367
01.03	Agricultural Mechanics	1,725
01.04	Agricultural Products	139
01.06	Agricultural Resources	369
01.07	Forestry	268
04	<u>DISTRIBUTION</u> Total # of Teachers/Total # of Teachers in M.I. Occupations (FTE)	233
04.03	Automotive	150
04.16	Petroleum	83
16	<u>TECHNICAL</u> Total # of Teachers/Total # of Teachers in M.I. Occupations (FTE)	695
16.0101	Aeronautical Technology	29
16.0103	Architectural Technology	78
16.0104	Automotive Technology	27
16.0106	Civil Technology	16
16.0107	Electrical Technology	88
16.0108	Electronic Technology	308
16.0109	Electromechanical Technology	15
16.0110	Environmental Control Technology	7
16.0111	Industrial Technology	11
16.0112	Instrumental Technology	14

1/ FTE: Full-Time Equivalents (Rounded to Nearest Whole Number).

Source: FY75 State Annual Report, Except Maryland, New York, North Dakota, Illinois, Indiana, and South Carolina where data are for FY76.

Table 3-d (cont'd)

National Teacher Employment in Secondary
Male-Intensive Vocational Programs

Code	Title	Number of Teachers
16.0113	Mechanical Technology	37
16.0114	Metallurgical Technology	8
16.0601	Commercial Pilot Training	4
16.0602	Fire and Fire Safety Technology	11
16.0605	Police Science	42
17	<u>TRADES AND INDUSTRY</u> Total # of Teachers/Total # of Teachers in M.I. Occupations (FTE)	27,892
17.01	Air Conditioning	567
17.02	Appliance Repair	266
17.0301	Body and Fender Repair	1,260
17.0302	Auto Mechanics	4,999
17.0399	Other Automotive	1,054
17.0400	Aviation Occupations	283
17.0500	Blueprint Reading	25
17.0600	Business Machine Maintenance	66
17.0800	Commercial Fishery Occupations	15
17.1001	Carpentry	2,323
17.1002	Electricity	756
17.1004	Masonry	700
17.1007	Plumbing and Pipefitting	295
17.1099	Other Construction & Maintenance	1,834
17.1100	Custodial Service	217

Table 3-d (cont'd)

National Teacher Employment in Secondary
Male-Intensive Vocational Programs

Code	Title	Number of Teachers
17.1200	Diesel Mechanic	164
17.1300	Drafting Occupations	2,356
17.1400	Electrical Occupations	870
17.1500	Electronic Occupations	1,759
17.1700	Foremanship Supervisor and Management Development	21
17.1900	Graphic Arts Occupations	1,525
17.2100	Instrument Maintenance and Repair Occupations	31
17.2200	Maritime Occupations	65
17.2302	Machine Shop	1,294
17.2303	Machine Tool Operation	119
17.2305	Sheet Metal	227
17.2306	Welding and Cutting	1,224
17.2307	Tool and Die Making	31
17.2399	Other Metalworking	1,380
17.2400	Metallurgy Occupations	61
17.2601	Barbering	24
17.2801	Fireman Training	14
17.2802	Law Enforcement Training	125
17.3000	Refrigeration	73
17.3100	Small Engine Repair	705
17.3200	Stationary Energy Sources Occupations	38

Table 3-d (cont'd)National Teacher Employment in Secondary
Male-Intensive Vocational Programs

Code	Title	Number of Teachers
17.3400	Leather Working	33
17.3600	Woodworking	1,093
	<u>SPECIAL PROGRAMS</u>	
99.0400	Industrial Arts	21,095

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Table 3-e. -- Projected Additional Secondary Vocational Education Teachers Needed by Broad Classifications, by State for 1978-79 and 1979-80 (Excluding Teachers Expected to be Trained through Pre-service Programs)

States	Agriculture		Technical		Trade and Industrial		Industrial Arts	
	1978-79	1979-80	1978-79	1979-80	1978-79	1979-80	1978-89	1979-80
Alabama	+1	+2	0	0	+118	+132	-2	-2
Alaska	5	5	0	0	46	2	-	-
Arizona	1	3	0	0	18	20	2	2
Arkansas	9	12	0	0	29	31	6	3
California	28	18	19	19	469	422	-	-
Colorado	10	8	13	13	101	104	-	-
Connecticut	-2	-4	0	0	15	14	0	-15
Delaware	7	4	3	2	22	21	1	1
District of Columbia	0	0	0	0	0	0	0	0
Florida	111	116	-	-	214	224	106	107
Georgia	4	4	0	0	67	68	13	12
Hawaii	2	1	0	0	2	3	-	-
Idaho	0	0	0	0	3	4	-	-
Illinois	30	29	0	0	41	36	120	114
Indiana	1	0	0	0	26	26	-	-
Iowa	27	30	0	0	32	35	-	-
Kansas	12	14	0	0	10	12	-	-
Kentucky	-22	-31	5	5	36	36	1	1
Louisiana	-15	-16	0	0	16	12	-5	-6
Maine	4	6	0	0	-2	+2	-18	-18
Maryland	-3	-3	1	<1	25	19	15	45
Massachusetts	2	5	1	2	4	-9	0	0
Michigan	-5	-5	0	0	-3	-5	-	-
Minnesota	14	0	0	0	5	-4	-	-
Mississippi	-9	-6	0	0	38	36	-2	-5
Missouri	-7	-6	4	4	161	163	-	-
Montana	1	-1	0	0	0	0	0	0
Nebraska	7	3	0	0	8	9	-1	0
Nevada	-1	0	3	0	15	10	-	-
New Hampshire	4	3	0	0	23	27	-	-
New Jersey	-16	-16	14	14	115	118	-	-
New Mexico	6	9	0	0	8	6	15	13
New York	2	2	5	5	119	122	-	-
North Carolina	17	13	0	0	412	423	0	1
North Dakota	3	5	0	0	2	2	-	-
Ohio	46	43	0	0	146	139	-	-
Oklahoma	3	3	0	0	55	67	-	-
Oregon	10	11	0	0	40	43	160	168
Pennsylvania	5	0	19	18	101	104	-1	+1
Rhode Island	-7	-8	2	2	0	-1	-1	-1
South Carolina	-3	2	4	3	61	61	-	-
South Dakota	3	10	0	0	4	8	-	-
Tennessee	-11	-12	1	1	100	48	0	-1
Texas	-66	-56	6	7	321	343	5	6
Utah	-1	-2	0	0	2	3	-	-
Vermont	-6	-6	0	0	3	4	2	2
Virginia	17	12	0	0	125	144	158	180
Washington	7	2	0	0	55	19	-	-
West Virginia	0	0	2	0	34	33	-	-
Wisconsin	13	12	0	0	24	24	(Included in T & I)	
Wyoming	0	1	<1	<1	-2	-7	-	-
National	238	216	100	94	3,264	3,182	474	578

SOURCE: Estimates developed from FY75 State Annual Report and FY77 State Vocational Education Plans.

Table 3-f. -- Number of Students Per Teacher in Secondary Male-Intensive Vocational Programs

State	Agriculture	Technical	Trade and Ind. Education	Ind. Arts <u>1/</u>
ALABAMA	67	-	38	142
ALASKA	25	-	29	-
ARIZONA	31	-	20	67
ARKANSAS	75	-	48	35
CALIFORNIA	93	28	90	-
COLORADO	38	23	25	-
CONNECTICUT	35	-	27	-
DELAWARE	53	22	47	-
DISTRICT OF COLUMBIA	-	-	80	-
FLORIDA	50	39	34	168
GEORGIA	117	-	37	110
HAWAII	128	83	87	-
IDAHO	75	-	46	-
ILLINOIS	58	-	59	-
INDIANA	60	-	28	-
IOWA	71	-	31	-
KANSAS	56	-	19	-
KENTUCKY	60	12	32	148
LOUISIANA	78	-	44	20
MAINE	82	-	39	69
MARYLAND	56	6	36	119
MASSACHUSETTS	14	49	20	39
MICHIGAN	90	-	33	-
MINNESOTA	73	-	45	-
MISSISSIPPI	63	-	31	99
MISSOURI	54	14	22	-
MONTANA	60	2	62	33
NEBRASKA	70	-	95	72
NEVADA	33	66	59	-
NEW HAMPSHIRE	52	-	36	70

Table 3-f. -- Number of Students Per Teacher in Secondary Male-Intensive Vocational Programs (Continued)

	Agriculture	Technical	Trade and Ind. Education	Ind. Arts
NEW JERSEY	28	22	22	-
NEW MEXICO	70	-	34	119
NEW YORK	16	59	26	-
NORTH CAROLINA	88	-	42	152
NORTH DAKOTA	64	-	34	-
OHIO	40	-	24	-
OKLAHOMA	45	-	31	-
OREGON	35	-	32	29
PENNSYLVANIA	40	31	37	114
RHODE ISLAND	127	51	57	9
SOUTH CAROLINA	24	-	20	41
SOUTH DAKOTA	60	-	32	-
TENNESSEE	76	27	38	28
TEXAS	43	21	19	18
UTAH	59	-	68	-
VERMONT	41	-	23	72
VIRGINIA	60	-	37	148
WASHINGTON	135	-	25	-
WEST VIRGINIA	57	29	29	-
WISCONSIN	22	-	90	-
WYOMING	39	-	25	-
NATIONAL	60	25	37	77

Based on FY 75 and 76 State Annual Reports.

1/ Due to the inconsistency of data available for industrial arts, the national average is based on those states where matching data are available for both student enrollment and teacher employment.

Table 3-h. -- Percent Women Enrolled in Secondary Male-Intensive Vocational Programs, by State (Continued)

Occupations	Percent U.S.	States																		
		MI	MN	MS	MO	MT	NE	NV	NH	NJ	NM	NY	NC	ND	OH	OK	OR	PA	RI	
Air Conditioning	2	1	4	0	0	-	-	0	-	1	0	0	0	-	0	1	-	1	2	
Appliance Repair	3	5	2	9	-	17	0	0	-	1	0	8	-	-	1	0	-	1	-	
Auto Body/Fender	2	0	1	5	-	0	0	1	-	0	6	-	1	0	0	0.3	-	1	-	
Auto Mechanics	5	4	4	3	1	2	3	33	1	0	1	2	3	4	-	4	3	6	5	
Other Automotive	6	3	4	20	2	22	3	12	-	9	8	-	6	-	1	0	-	13	-	
Business Machine Maintenance	10	1	0	0	33	-	-	0	-	0	0	-	7	-	7	25	-	1	-	
Commercial Fishery	22	56	-	0	100	-	-	0	-	-	-	-	22	-	-	-	-	-	-	
Carpentry	3	3	3	4	1	5	1	4	1	0	3	-	4	-	0	1	-	3	3	
Electricity	1	1	1	4	1	0	0	0.4	-	0	3	-	3	-	0	2	-	0	1	
Masonry	2	0	0	4	1	-	0	5	-	0	0	-	2	-	0	1	-	2	-	
Plumbing/Pipefitting	1	0	2	9	0	-	1	-	-	0	0	-	6	-	0	0	-	1	-	
Other Construction and Maintenance	3	5	-	0.4	1	-	0	3	0	0	5	5	51	5	1	5	3	11	3	
Custodial Services	11	3	0	46	17	-	17	-	0	16	4	2	-	5	29	7	-	0	11	
Diesel Mechanic Training	1	0	0	0	5	-	1	0	-	0	0	-	-	-	0	0	-	2	-	
Drafting	11	6	11	19	9	8	9	33	3	10	8	9	16	8	9	17	13	7	11	
Electrical	2	2	0	4	1	-	1	8	0	1	0	2	1	0	0	0	-	1	2	
Electronics	5	2	7	22	2	11	3	30	3	1	11	2	12	1	1	3	4	6	5	
Graphic Arts	21	26	25	30	27	38	12	26	10	4	21	17	37	23	21	34	46	23	21	
Maritime	5	0	0	-	-	-	-	-	-	0	0	3	15	-	-	-	-	-	-	
Metalworking	3	2	4	4	1	2	3	0.2	0.3	0	18	4	3	0.2	0	1	2	2	5	
Metallurgical	4	0	4	-	0	-	-	0	-	-	0	-	-	-	-	0	-	-	-	
Barbering	19	-	-	-	0	-	-	-	-	0	-	-	-	-	0	0	-	-	19	
Fireman Training	2	-	-	-	0	-	-	0	0	-	-	-	-	-	0	0	-	-	-	
Law Enforcement	12	21	1	-	13	-	-	8	-	0	0	20	-	-	23	46	-	11	12	
Refrigeration	1	0	0	0	0.3	-	-	0	-	-	7	-	-	-	0	0	-	1	-	
Small Engine Repair	1	3	4	6	4	3	-	3	0	0	0	-	6	0	4	4	-	3	3	
Stationary Energy Sources	1	-	0	0	0	-	-	-	-	0	-	-	-	-	0	0	-	1	-	
Leatherworking	19	0	0	1	0	-	-	-	-	-	100	-	0	-	3	50	-	32	-	
Woodworking	11	8	3	21	4	-	X	0	-	0	1	-	8	-	5	8	-	0	11	
TOTAL TRADE & INDUSTRIAL EDUCATION	6	5.0	6.1	5.3	4.0	5.1	3.2	12.5	1.5	1.7	7.1	3.4	8.5	4.2	2.7	4.4	5.3	4.6	5.1	
Industrial Arts	13	-	-	12	-	-	-	-	7	-	10	-	4	-	-	-	13	-	13	
Technical	6	-	-	-	3.1	2	-	7.6	-	2.1	-	5.6	-	-	-	-	-	3.9	6	
Agricultural	7	12.7	12.1	1.2	5.7	6.4	6.7	26.4	13.5	2.9	17.8	12.7	7.3	6.6	6.7	2.1	18.9	7.6	7	
AVERAGE FOR STATE	7.5	6.9	8.7	7.4	5.5	5.6	5.5	13.0	6.6	1.9	11.8	5.0	8.9	5.9	4.3	3.1	12.0	8.0	7.5	

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Table 3-h. -- Percent Women Enrolled in Secondary Male-Intensive Vocational Programs, by State

Occupations	Percent U.S.	States																							
		AL	AK	AZ	AR	CA	CO	CT	DE	DC	FL	GA	HI	ID	IL	IN	IA	KS	KY	LA	ME	MD	MA		
Air Conditioning	2	1	1	3	1	0.4	-	0	-	0	1	3	-	-	1	0	-	0	4	1	0	1	1		
Appliance Repair	3	7	-	0	5	6	1	2	3	0	3	2	-	0	7	7	-	3	2	2	0	1	0		
Auto Body/Fender	2	0	6	0	1	1	1	0	2	0	1	-	-	0	1	2	2	1	-	1	1	2	-		
Auto Mechanics	5	2	0	1	6	3	2	2	5	2	2	0	4	1	3	9	11	6	2	2	1	3	5		
Other Automotive	6	3	-	1	8	5	2	1	6	-	1	3	0	0	4	17	6	9	-	-	-	1	23		
Business Machine Maintenance	10	1	-	0	10	5	12	-	10	0	3	30	-	0	14	-	-	0	2	38	0	14	0		
Commercial Fishery	22	0	4	-	0	6	-	-	-	-	-	-	-	-	-	-	-	-	0	5	-	-			
Carpentry	3	2	3	0	3	3	2	2	3	0	1	4	-	0	3	3	1	2	3	1	1	2	3		
Electricity	1	1	3	0	0	2	1	1	-	0	1	2	-	1	1	-	0	0	1	0	-	0			
Masonry	2	1	-	6	0	0.3	2	0	-	0	0.4	1	-	0.3	1	-	3	0	0	0	2	1			
Plumbing/Pipefitting	1	0	X	-	0	-	0	1	1	0	1	0	-	0	2	-	0	0	0	0	1	0			
Other Construction and Maintenance	3	2	3	2	2	3	1	6	3	-	3	3	1	0	3	5	9	5	0	10	1	0	4		
Custodial Services	11	12	X	-	9	-	15	21	11	-	12	27	-	29	14	13	15	10	0	-	6	2	10		
Diesel Mechanic Training	1	0	X	0	4	0	0	2	1	0	2	1	-	0	2	0	1	0	0	0.2	0	0	0		
Drafting	11	11	4	9	11	5	17	8	11	28	11	13	10	7	6	10	20	13	13	17	4	11	9		
Electrical	2	X	0	17	4	3	2	0	2	6	1	3	-	1	4	14	1	4	1	-	0	1	2		
Electronics	5	1	9	2	5	9	8	2	5	0	6	1	-	2	2	4	9	9	1	1	0	4	6		
Graphic Arts	21	24	15	37	38	17	28	10	21	6	29	23	21	19	14	16	28	23	29	0	20	26	17		
Maritime	5	X	X	X	-	-	-	-	-	-	1	-	-	0	-	-	-	-	0	0	3	-			
Metalworking	3	1	5	0.3	1	2	1	5	5	0	1	16	2	0	2	2	2	7	1	1	0.2	2	1		
Metallurgical	4	X	X	X	14	-	-	-	4	0	-	-	-	0.3	-	-	-	-	-	0	-	1			
Barbering	19	26	X	X	-	-	-	37	19	8	11	15	-	100	15	20	-	-	-	0	27	-			
Fireman Training	2	X	X	2	-	2	-	-	-	-	0	-	-	2	-	-	0	-	-	0	-	-			
Law Enforcement	12	X	X	39	0	34	0	-	-	-	29	-	-	0	16	-	6	2	4	-	8	-			
Refrigeration	1	1	X	X	0	0	-	-	-	-	0	8	-	-	1	0.2	8	0	1	-	-	0			
Small Engine Repair	3	1	1	9	4	2	1	0	3	0	4	2	-	0	3	3	2	2	0	0.3	0	6	2		
Stationary Energy Sources	1	X	0	-	50	-	-	-	1	-	3	50	-	-	2	-	-	0	-	-	-	0			
Leatherworking	19	8	X	X	26	-	0	-	-	0	0	-	-	0	43	0	-	-	-	0	78	0	29		
Woodworking	11	1	1	4	22	4	1	-	1	0	5	6	-	4	17	35	12	5	3	2	6	4			
TOTAL TRADE & INDUSTRIAL EDUCATION	6	3.3	3.3	3.2	6.6	5.9	4.1	4.2	5.4	4.2	5.7	8.7	5.2	1.4	4.4	6.3	5.9	7.4	3.2	2.8	3.8	5.6	4.3		
Industrial Arts	13	-	-	8	-	5	-	-	13	-	-	5	-	-	-	-	5	-	4	-	-	6			
Technical	6	X	X	X	X	15	6	-	14	-	3.7	-	1.9	-	-	-	-	8.6	4	-	-	2.8	10.4		
Agricultural	7	1.4	X	16	5.5	24	15	28.6	7	-	11.8	5.9	13	7.0	11.1	7.7	6.5	4.3	7.5	2.8	7.0	20.4	19.6		
AVERAGE FOR STATE	7.5	3	3.4	7.4	5.8	9.6	6.8	6.8	7.5	4.1	6.0	6.5	7.0	5.2	5.3	7.4	6.4	5.3	4.4	3.0	4.5	8.0	5.1		

Table 3-h. -- Percent Women Enrolled in Secondary Male-Intensive Vocational Programs, by State (Continued)

Occupations	Percent U.S.	States											
		SC 1/	SD	TN	TX 1/	UT	VT	VA 1/	WA 1/	WV	WI	WY	
Air Conditioning	1	1	-	2	2	-	-	1	-	1	-	-	
Appliance Repair	3	0	-	2	6	24	-	0	1	0	19	-	
Auto Body/Fender	2	1	0	1	2	22	0	0	3	1	7	-	
Auto Mechanics	5	1	2	2	2	24	12	1	4	5	7	16	
Other Automotive	6	0	-	12	3	18	18	5	5	10	10	-	
Business Machine Maintenance	10	12	-	5	5	19	10	X	-	0	-	-	
Commercial Fishery	22	-	-	0	-	-	-	X	4	-	-	-	
Carpentry	3	1	1	1	1	26	-	0	11	20	8	3	
Electricity	1	2	-	0.4	2	26	-	X	-	2	-	1	
Masonry	2	2	-	0.3	2	22	-	0	-	1	-	-	
Plumbing/Pipefitting	1	1	-	0	1	10	-	0	-	0	-	-	
Other Construction and Maintenance	3	0	-	3	3	26	-	2	2	1	7	-	
Custodial Services	11	8	-	25	-	-	0	10	X	5	12	-	
Diesel Mechanic Training	1	-	-	0	1	17	0	0	-	1	-	-	
Drafting	11	12	10	7	14	26	13	14	7	5	11	27	
Electrical	2	-	-	2	3	31	1	0	-	1	9	X	
Electronics	5	4	1	7	4	26	0	4	10	1	33	X	
Graphic Arts	21	46	27	23	32	26	6	21	39	17	14	32	
Maritime	5	-	-	-	1	-	-	0	6	-	-	-	
Metalworking	1	1	0.7	3	2	12	1	1	2	1	9	8	
Metallurgical	4	-	-	-	-	-	-	X	-	-	-	-	
Barbering	19	-	-	67	-	-	-	0	-	-	-	-	
Fireman Training	2	-	-	0	0	-	-	0	-	-	-	-	
Law Enforcement	12	-	-	0	-	26	12	0	-	-	-	-	
Refrigeration	1	-	-	1	-	15	-	0	50	-	-	-	
Small Engine Repair	3	0.2	-	1	2	13	31	0	3	22	8	15	
Stationary Energy Sources	1	-	-	100	0	-	-	0	-	-	-	-	
Leatherworking	19	0	-	1	30	50	-	0	-	66	-	-	
Woodworking	11	0	-	10	3	23	29	13	X	7	8	10	
TOTAL TRADE & INDUSTRIAL EDUCATION	6	3.8	2.0	4.5	4.1	23.2	6.9	4.0	8.6	4.0	10.5	12.6	
Industrial Arts	13	10	-	-	11	45	0	9	-	-	-	16	
Technical	6	-	-	1.7	32.8	-	-	-	-	0.4	-	0	
Agricultural	7	3.3	6.9	1.9	9.1	41	10.9	1.4	15.6	4.9	9.3	15.6	
AVERAGE FOR STATE	7.5	4.7	5.4	3.3	7.9	40.0	7.9	5.9	14.3	4.2	10.2	15.0	

SOURCE: FY State Annual Reports

1/ 1976 Data.

2/ Due to unavailability of data by sex for state, the national percentage is used.

3/ X indicates enrollment of less than 40 in the state

- indicates no secondary enrollment in the state.

Table 3-i

Major Expansion or Reduction of Training Based on Economic Expansion in Male-Intensive
Occupations at the Secondary Level, by State--Projected to 1978

Occupations	No. Proj. (thousands) (1978)	Percent Gain 1973-1978	States																									
			AL	AK	AZ	AR	CA	CO	CT	DE	DC	FL	GA	HI	ID	IL	IN	IA	KS	K.	LA	ME	MD	MA				
Air Conditioning	119	81%	X				X					(X)	X			(X)												
Appliance Repair	28	100%			X	X	X					X																
Auto Body/Fender	98	84%					X					X	X			(X)												
Auto Mechanics	497	83%					X									X												
Other Automotive	60	110%					X																					
Aviation	53	5%					X					X				X												
Business Machine Maintenance	6	79%					X					X				X				X								
Commercial Fishery	35	30%					X					X				X												
Carpentry	207	91%					X					X				X												
Electricity	98	52%					X									X									X			
Masonry	59	73%	X																									
Plumbing/Pipefitting	68	74%										X																
Other Construction and Maintenance	123	16%																										
Custodial Services	20	24%					X	X				X				X												
Diesel Mechanic Training	26	89%					X																					
Drafting	163	18%					X									X												
Electrical	200	90%														X				X								
Electronics	149	39%					X					X				X												
Graphic Arts	109	51%					X									X												
Instrument Maintenance and Repair	5	68%																										
Maritime	12	53%					X					X				X					X				X			
Metalworking	449	44%			X	X	X									X												
Metallurgical	10	170%			X	X	X						X			X									X			
Barbering	9	125%							X				X															
Fireman Training	39	91%					X							X		X												
Law Enforcement	176	86%					X					X																
Refrigeration	15	76%					X																					
Small Engine Repair	64	104%					X					X				X												
Stationary Energy Sources	15	67%	X				X																					
Leatherworking	5	88%	X									X																
Woodworking	147	114%					X									(X)									X			
Cooperative Education 2/							X					X	X			X												
Technical	451	72%					X					X	(X)									(X)		(X)	X			
Agricultural	881	12%	(X)				X					X			X	X	(X)	X	X			(X)	(X)					

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Source: State Vocational Education Plans.

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Table 3-i. (Continued)

Major Expansion or Reduction of Training Based on Economic Expansion in Male-Intensive Occupations at the Secondary Level, by State--Projected to 1978

Occupations	States																							
	MI	MN	MS	MO	MT	NE	NV	NH	NJ	NM	NY	NC	ND	OH	OK	OR	PA	RI	SC	SD	TN	TX	UT	
Air Conditioning									X		X												X	
Appliance Repair									X			X					X							
Auto Body/Fender														X			X							
Auto Mechanics											X	X					X						X	
Other Automotive									X															
Aviation											X													
Business Machine Maintenance																			X					
Commercial Fishery	X	X									X										X	X		
Carpentry												X					X							
Electricity									X			X							X					
Masonry												X							X					
Plumbing/Pipefitting									X								X					X		
Other Construction and Maintenance											X	X										X		
Custodial Services	X					X						X												
Diesel Mechanic Training		X													X		X							
Drafting											X	X										X		
Electrical		X									X											X		
Electronics											X											X		
Graphic Arts	X										X													
Instrument Maintenance and Repair	X								X		X										X	X		
Maritime																								
Metalworking	X													X							X			
Metallurgical	X					X																		
Barbering									X															
Fireman Training							X							X										
Law Enforcement									X					X										
Refrigeration	X											X												
Small Engine Repair	X											X					X					X		
Stationary Energy Sources		X										X					X				X			
Leatherworking												X					X							
Woodworking																								
Cooperative Education	X										X			X										
Technical					(X)		(X)		(X)	(X)		(X)	(X)			(X)	(X)			(X)		X		
Agricultural					X	X			X		(X)			X						X		X		

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Table 3-i. (Continued)

Major Expansion or Reduction of Training Based on Economic Expansion in Male-Intensive Occupations at the Secondary Level, by State--Projected to 1978

Occupations	States					
	VT	VA	WA	WV	WI	WY
Air Conditioning						
Appliance Repair						
Auto Body/Fender					X	
Auto Mechanics						
Other Automotive					X	
Aviation			X			
Business Machine Maintenance			X			
Commercial Fishery						
Carpentry						
Electricity					X	
Masonry		X				
Plumbing/Pipefitting					X	
Other Construction and Maintenance						
Custodial Services						
Diesel Mechanic Training					X	
Drafting					X	
Electrical						
Electronics						
Graphic Arts					X	
Instrument Maintenance and Repair		X				
Mar time		X	X			
Metalworking					X	
Metallurgical		X				
Barbering		X			X	
Fireman Training		X				
Law Enforcement						
Refrigeration						
Small Engine Repair						
Stationary Energy Sources						
Leatherworking						
Woodworking						
Cooperative Education						
Technical			(X)			(X)
Agricultural	X				X	

1/ An oversupply of electrical, electronics and mechanical, but acute undersupply of fire and safety technical occupations.

2/ Data on cooperative education projection not available.

3/ Projected number for 1978 and percent gain 1973-1978 include enrollment for all levels: secondary, adult, and postsecondary.

X - Expansion

(X) - Reduction

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Table 3-j
Male-Intensive Occupational
Programs by DOT Characteristics

Vocational Ed. Title	DOT Title	Physical Demands						General Education Development		Spec. Voc. Preparation		
		Sedentary, Light, Medium, Heavy	Climbing/Balancing	Stooping, Kneeling Crouching, Crawling	Reaching, Handling, Feeling, Fingering	Talking/Hearing	Seeing	Common sense to carry out instruct. Make arithmetic calculations	Rational principals to solve problems. Interpret variety of instructions, ordi- nary arith., alge- braic & geometric proceed.	1-2 years	3-4 years	5-10 years
17.01 Air Conditioning	Air cond. mechanic Evap. Cooler installer	H M	X X	X X	X X	X	X	 X	 X	 X		X
17.0301 Body & Fender	Auto Body Repairer	M		X	X		X	X			X	
17.0302 Auto Mechanic	Auto Mechanic	M		X	X	X	X		X		X	
17.1001 Carpen- try Const.	Carpenter, Const. Carpenter, Rough	M H	X X	X X	X X		X	 X	 X		X	X
17.1002 Electricity	Electrician	M	X	X	X		X		X		X	
17.1004 Masonry	Bricklayer (Brick & Tile) Bricklayer (Const.) Stone Mason Cement Mason	H M M M	X X X X	X X X X	X X X X		X X X X	X X X X			X	X X
17.1007 Plumbing & Pipefitting	Pipefitter I, Const. Pipefitter, Maintenance Plumber	H H H	X X X	X X X	X X X		X X X		X X X	X X X		
17.1300 Drafting	Drafter, Architect Drafter (Aeronautical, Electronic, Electrical, Civil, Structural, Mecha- nical, Geological and Marine) 1/	S S				X	X		X		X	

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1/ Logical & scientific thinking to define problem, draw conclusions, interpret technical instructions, advanced math & statistics.

Table 3-j
(continued)
Male-Intensive Occupational
Programs by DOT Characteristics

Vocational Ed. Title	DOT Title	Physical Demands						General Education Development		Spec. Voc. Preparation		
		Sedentary, Light, Medium, Heavy	Climbing/Balancing	Stooping, Kneeling Crouching, Crawling	Reaching, Handling, Feeling, Fingering	Talking/Hearing	Seeing	Common sense to carry out instruct. Make arithmetic calculations	Rational principals to solve problems. Interpret variety of instructions; ordi- nary arith., alge- braic & geometric proceed.	1-2 years	3-4 years	5-10 years
17.14 Electri- cal Occup.	Line Erector	H	X	X	X	X	X		X		X	
	Line Repairer	H	X	X	X	X	X		X		X	
	Cable Installer	M	X	X	X		X		X			X
	Line Installer-Repairer (telephone)	M			X		X		X		X	
17.15 Elec- tronic Occup.	T.V. & Radio Repair	M			X	X	X		X		X	
	Telephone Installer- Repairer	L	X	X	X		X		X	X		
17.19 Graphic Arts	Bookbinder	L			X		X	X		X		
	Compositor I	L			X							X
	Electrotyper	H			X		X	X	X			X
	Photoengraver	L			X		X	X				X
17.2302 Ma- chine shop	Machinist I	M			X		X		X		X	
	Job & Die Setter	M		X	X	X	X		X		X	
17.2306 Welding and Cutting	Welder, Combination	H		X	X		X	X		X		
	Welder, Repair	H		X		X	X	X		X		
	Welder, Fitter	H		X	X	X	X		X		X	
	Welding Mach. Op., ARC	M		X	X		X	X		X		
	Flame-Cutting Mach. Op. 1/ Solderer-Assembler 2/	M		X	X		X	X				
17.310 Small Engine Repair	Motorcycle Repair	M		X	X		X	X		X		
	Motorboat Mech.	M	X	X	X	X	X		X		X	
17.36 Wood- working	Cabinetmaker	M			X		X		X	X		
	Furniture Finisher	L			X		X		X		X	

SOURCE: U.S. Department of Labor, Manpower Administration. Selected Characteristics of Occupations,
A Supplement to the Dictionary of Occupational Titles, Third Edition, 1966.

1/ 6 months - one year

2/ 3 - 6 months.

SOURCE: U.S. Dept. of Labor,
Manpower Administration.
Dictionary of Occupa-
tional Titles, 1965,
Vol. II, Third Edition.

- ☒ Main Range
☒ Additional Ranges

Figure 3-k. -- Aptitudes--Craftsmen and Related Work (GATB)

	Intelli- gence	Verbal ability	Numerical ability	Spatial ability	Form perception	Clerical perception	Motor coordi- nation	Finger dexterity	Manual dexterity
Top 10% an ex- tremely high degree of the aptitude									
Next highest third. Above average or high degree of the aptitude									
Middle third. Slightly below to slightly above average aptitude									
Next lowest third. Below average or low degree of the aptitude									
Lowest 10%. Negligible de- gree of the aptitude									

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OCCUPATIONS:	VOC. ED. TITLES:	OCCUPATIONS:	VOC. ED. TITLES:	OCCUPATIONS:	VOC. ED. TITLES:
Air Cond. Mechanic	Air Conditioning	Bricklayer	Masonry	Cables Installer	Electr. Occ.
Evap/Cooler Installer	Air Conditioning	Pipefitter	Plumbing/Pipefitting	TV Radio Repairer	Electronic Occ.
Auto Body Repairer	Body and Fender	Plumber	Plumbing/Pipefitting	Telephone Installer	Electronic Occ.
Auto Mechanic	Auto Mechanics	Drafter	Drafting	Electrotyper	Graphic Arts
Carpenter, Const.	Carpentry, Const.	Line Erector	Electr. Occup.	Compositor I	Graphic Arts
Electrician	Electricity	Line Repairer	Electr. Occup.	Photoengraver	Graphic Arts
Motorcycle Repair	Small Engine Repair			Welder, Fitter	Welding
Motorboat Mechanic	Small Engine Repair			Furniture Finisher	Woodworking

Figure 3-1.

☒ Main Range
☒ Additional Ranges

Aptitudes -- Machine Work -- Set-Up and/or All-Round Operating (GATB)

	Intelli- gence	Verbal ability	Numerical ability	Spatial ability	Form perception	Clerical perception	Motor coord- ination	Finger dexterity	Manual dexterity
Top 10% an ex- tremely high degree of the aptitude									
Next highest third. Above average or high degree of the aptitude									
Middle third. Slightly below to slightly above average aptitude									
Next lowest third. Below average or low degree of the aptitude									
Lowest 10%. Negligible de- gree of the aptitude									

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OCCUPATIONS:

Machinist I
 Job & Die Setter
 Cabinetmaker

VOC. ED. TITLES:

Machine Shop
 Machine Shop
 Woodworking

SOURCE: U.S. Dept. of Labor, Manpower Administration,
 Ibid.

Figure 3-m.

- ☒ Main Range
☒ Additional Ranges

Aptitudes -- Precision Working (GATB)

	Intelli- gence	Verbal ability	Numerical ability	Spatial ability	Form perception	Clerical perception	Motor coordi- nation	Finger dexterity	Manual dexterity
Top 10% an ex- tremely high degree of the aptitude									
Next highest third. Above average or high degree of the aptitude									
Middle third. Slightly below to slightly above average aptitude									A-35
Next lowest third. Below average or low degree of the aptitude									
Lowest 10%. Negligible de- gree of the aptitude									

OCCUPATIONS:

Carpenter, Rough
Stone Mason

VOC. ED. TITLES:

Carpentry
Masonry

SOURCE: U.S. Dept. of Labor, Manpower Administration,
Ibid.

Figure 3-n.

- ☒ Main Range
☒ Additional Ranges

Aptitudes -- Manipulating (GATB)

	Intelli- gence	Verbal ability	Numerical ability	Spatial ability	Form perception	Clerical perception	Motor coord- ination	Finger dexterity	Manual dexterity
Top 10% an ex- tremely high degree of the aptitude									
Next highest third. Above average or high degree of the aptitude									
Middle third. Slightly below to slightly above average aptitude									
Next lowest third. Below average or low degree of the aptitude									
Lowest 10%. Negligible de- gree of the aptitude									

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OCCUPATIONS:

Cement Mason
 Bookbinder
 Welder, Combination

VOC. ED. TITLES:

Masonry
 Graphic Arts
 Welding and Cutting

SOURCE: U.S. Dept. of Labor, Manpower Administration,
 Ibid.

Figure 3-o.

Aptitudes -- Elementary Teachers (GATB)

- ☒ Main Range
☐ Additional Range

	Intelli- gence	Verbal ability	Numerical ability	Spatial ability	Form perception	Clerical perception	Motor coord- ination	Finger dexterity	Manual dexterity
Top 10%. an ex- tremely high degree of the aptitude									
Next highest third. Above average or high degree of the aptitude									
Middle third. Slightly below to slightly above average aptitude									A-37
Next lowest third. Below average or low degree of the aptitude									
Lowest 10%. Negligible de- gree of the aptitude									

Occupations:

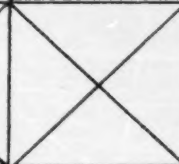
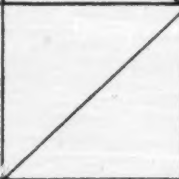
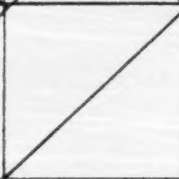
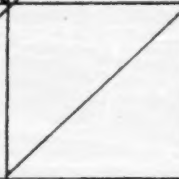
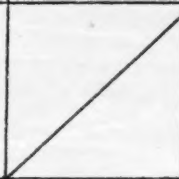
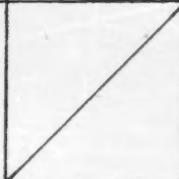
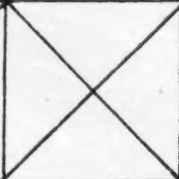
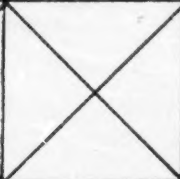
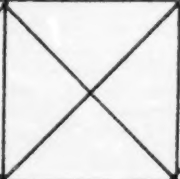
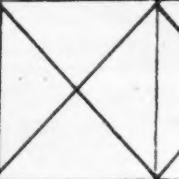
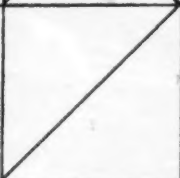
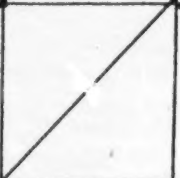
Kindergarten, Elementary School, and Related
Education

SOURCE: U.S. Dept. of Labor, Manpower Administration,
Ibid.

Figure 3-p.

 Main Range
 Additional Range

Aptitudes -- Secondary Teachers (GATB)

	Intelli- gence	Verbal ability	Numerical ability	Spatial ability	Form perception	Clerical perception	Motor coord- ination	Finger dexterity	Manual dexterity
Top 10%--an ex- tremely high degree of the aptitude									
Next highest third. Above average or high degree of the aptitude									
Middle third. Slightly below to slightly above average aptitude									
Next lowest third. Below average or low degree of the aptitude									
Lowest 10%. Negligible de- gree of the aptitude									

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Occupations:

High School, College, University, and Related
Education

SOURCE: U.S. Dept. of Labor, Manpower Administration,
Ibid.

Figure 3-q.

- ☒ Main Range
☒ Additional Range

Aptitudes -- Vocational Teachers (GATB)

	Intelli- gence	Verbal ability	Numerical ability	Spatial ability	Form perception	Clerical perception	Motor coord- ination	Finger dexterity	Manual dexterity
Top: 10%, an ex- tremely high degree of the aptitude									
Next highest third. Above average or high degree of the aptitude									
Middle third. Slightly below to slightly above average aptitude									A-39
Next lowest third. Below average or low degree of the aptitude									
Lowest 10%. Negligible de- gree of the aptitude									

Occupations:

Vocational Education

SOURCE: U.S. Dept. of Labor, Manpower Administration,
Ibid.

Table 3-r

GATB Aptitude Summary for Male-Intensive Occupations and
for Elementary, High School and Vocational Teachers

	Intelli- gence					Verbal ability					Numerical ability					Spatial ability					Form perception					Clerical perception					Motor co- ordination					Finger dexterity					Manual dexterity					
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5											
Craftsmanship and related work			O	X				X	O				O	X	O			X	O				O	X	O			O	O	X			O	X			O	X								
Machine work/ operating/con- trolling				X	O				O	X				O	X			O	X	O				O	X	O				X	O			X	O			X	O							
Precision work- ing					X	O			O	X					X			O	X				O	X	O					X			O	X			O	X			O	X				
Manipulating				X	O				X					X	O				O	X				X	O					O	X			X	O			X	O			X	O			
Elementary School teaching			X					X					O	X	O				X	O				X	O			O	X	O			X	O			X	O			X	O				
High School teaching			X	O				X	O				X	O	O				X	O				X	O			O	X	O			X	O			X	O			X	O				
Vocational Edu- cation Instruc- tor			X	O				X	O				X	O				X	O				X	O				X	O			X				X				X				X		

SOURCE: U.S. Dept. of Labor, Manpower Administration, Ibid.

X--Major Range 1 2 3 4 5
O--Additional Range high low

Table 3-s

GATB Aptitudes Requiring Higher Levels for Occupations than for Teachers

	Elementary Teachers	Secondary Teachers	Vocational Teachers	Craftsmen	Machine Workers	Precision Workers
Intelligence	2	1	1			
Verbal Ability	2	1	1			
Numerical Ability	3	1	2			
Spatial Ability	3	3	2	2	②	②
Form Perception	3	3	2	②	②	②
Clerical Perception	3	3	2			
Motor Coordination	3	3	3	②		②
Finger Dexterity	3	3	3	②		②
Manual Dexterity	3	3	3			

SOURCE: U.S. Dept. of Labor, Manpower Administration, Ibid.

Number - major range

○ - additional range

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Appendix BPossible Resources for Recruitment

National Education Association
Dr. Shirley McCune
Women's Caucus
1201 16th Street, N.W.
Washington, D.C. 20036
202-833-5426

American Federation of Teachers
Ms. Barbara Van Blake
Human Rights and Community Relations
Women's Rights Committee
11 Dupont Circle
Washington, D.C. 20036
202-797-4400

National Association of Teachers'
Agencies
Mr. E.Q. Taylor, Secretary-Treasurer
1825 K Street, N.W.
Suite 706
Washington, D.C. 20006
202-785-3534

American Industrial Arts Association
1201 16th Street, N.W.
Washington, D.C. 20036
202-833-4211

American Vocational Education
1510 H Street, N.W.
Washington, D.C. 20005
202-737-3722

International Union of Electrical
Radio and Machine Workers
AFL-CIO-CIC Education and Women's
Activities
1126 16th Street, N.W.
Washington, D.C. 20036
202-296-1200

Trade Unions Women's Program
New York State School of
Industrial and Labor Relations
7 E. 43rd Street
New York, New York 10017
212-697-2247

Union Women's Alliance
to Gain Equality (WAGE)
2137 Oregon Street
Berkeley, California 94705

National Urban League
Mrs. Sara Curry, Director
New National Skills Bank
477 Madison Ave., 14th Flr.
New York, New York 10022
212-644-6500

Minority Women Employment Program
Ms. Paulette Norvel, Director
Administrative Office
40 Marietta Street, N.W.
Suite 808
Atlanta, Georgia 30303
404-681-0001
(This is the headquarters. There are
8 field offices across the country.
Inquiries should be directed to
this office.)

Communications Workers of America
Women's Activities Department
1925 K Street, N.W.
Washington, D.C. 20006
202-785-6700

Coalition of Labor Union Women (CLUW)
8731 E. Jefferson
Detroit, Michigan 48214
313-926-5244

United Auto Workers
Women's Department
(Solidarity House)
8000 E. Jefferson
Detroit, Michigan 48214
313-926-5237

AFL-CIO
Women's Activities Department
815 16th Street, N.W.
Washington, D.C. 20006
202-637-5110

American Federation of State, County,
and Municipal Employees
Committee on Sex Discrimination
1625 L Street, N.W.
Washington, D.C. 20036
202-452-4800

North American Indian Women's Assoc.
Lorenia Butler, Vice President
5928 6th Street
Falls Church, Virginia 22041
703-343-5582